

# **EXHIBIT F**



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**Matlin et al.**(10) **Pub. No.: US 2006/0157601 A1**(43) **Pub. Date: Jul. 20, 2006**(54) **SHREDDER WITH LOCK FOR ON/OFF SWITCH**

(22) Filed: Feb. 2, 2006

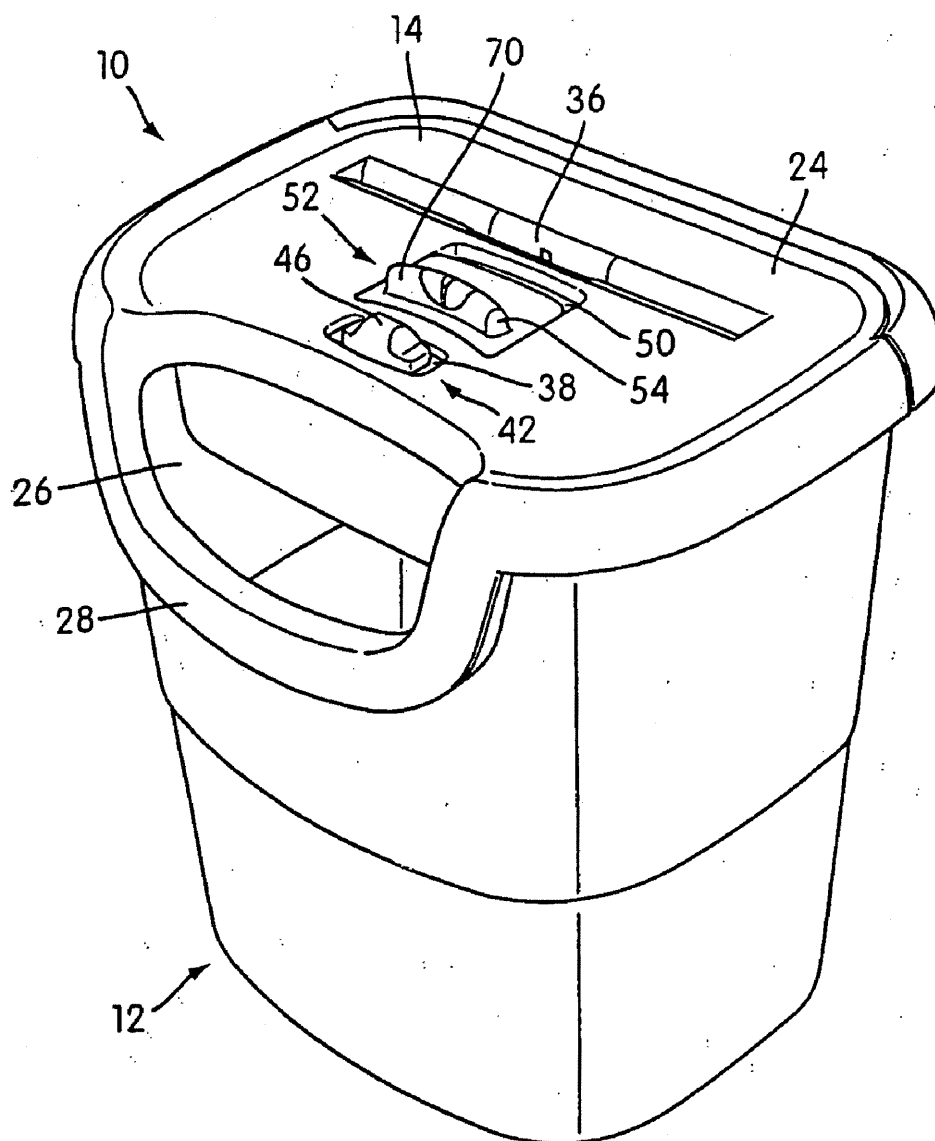
**Related U.S. Application Data**(75) Inventors: **Taihoon K. Matlin**, Round Lake Beach, IL (US); **David G. Hartnett**, Carol Stream, IL (US)

(63) Continuation of application No. 10/815,761, filed on Apr. 2, 2004, now Pat. No. 7,040,559.

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(52) **U.S. Cl.** ..... **241/100; 241/236**(73) Assignee: **Fellowes Inc.**, Itasca, IL(21) Appl. No.: **11/345,337**(57) **ABSTRACT**

The present application discloses a shredder with a switch lock that locks the on/off switch in its on/off position.



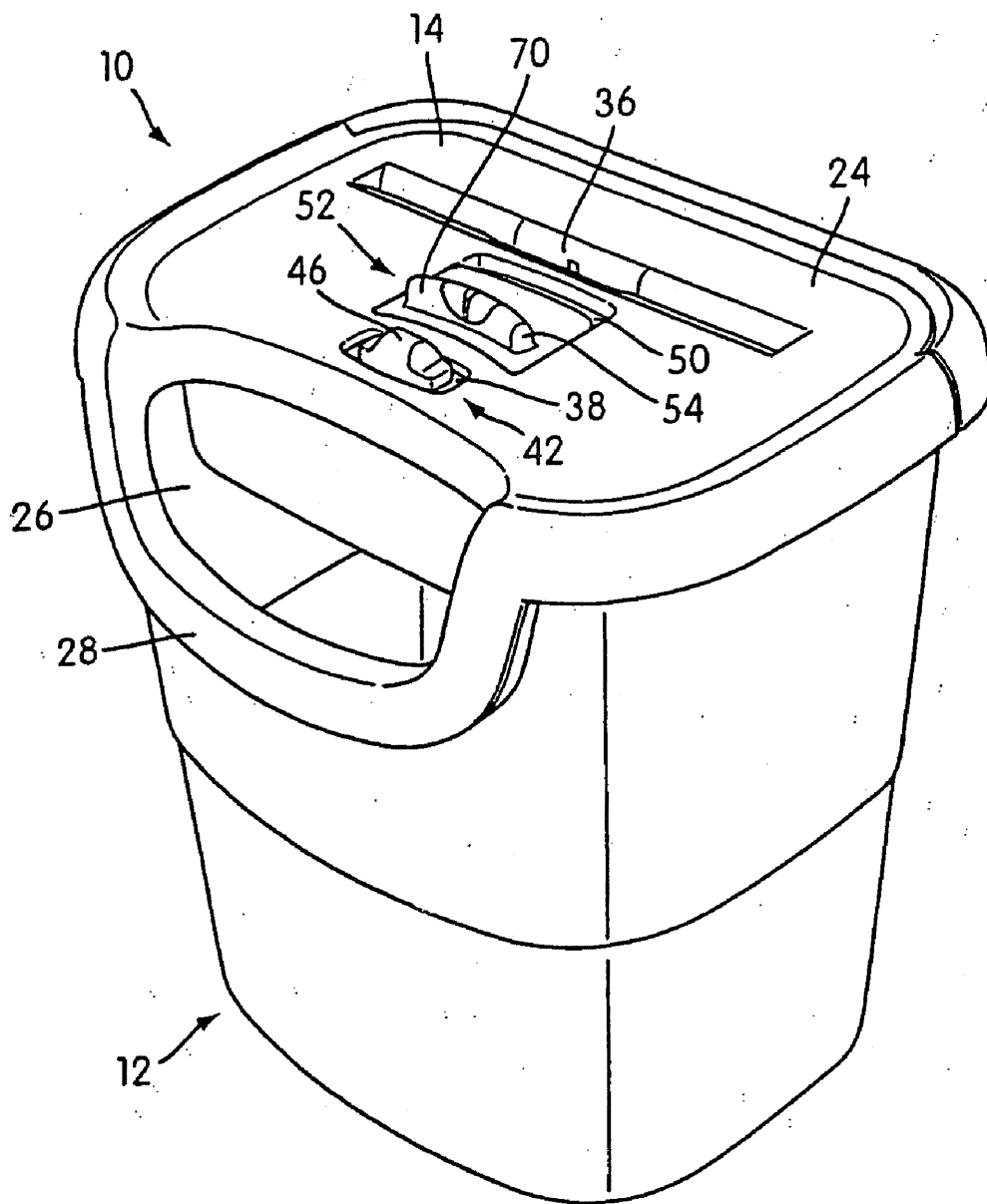


FIG. 1

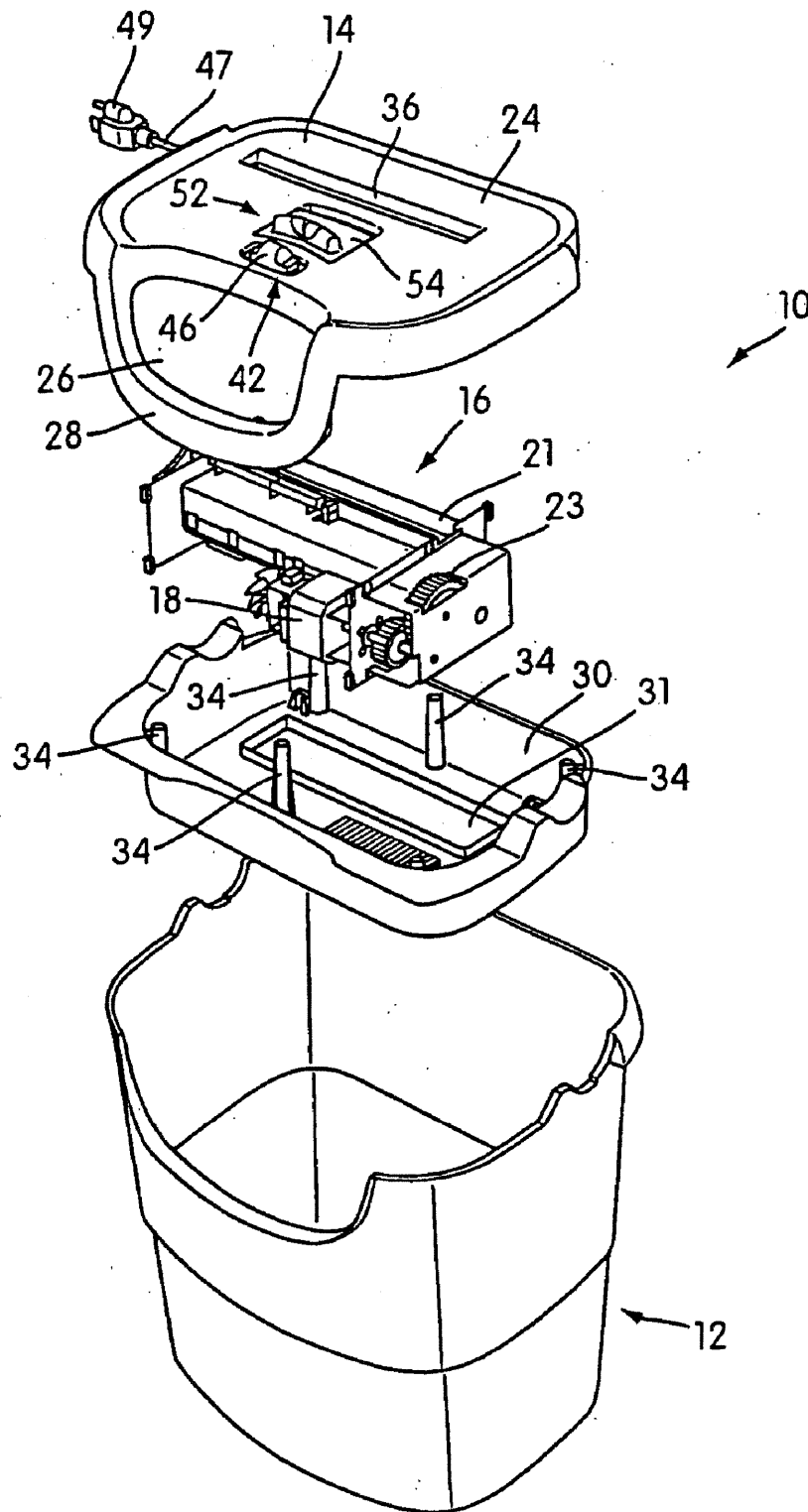


FIG. 1A

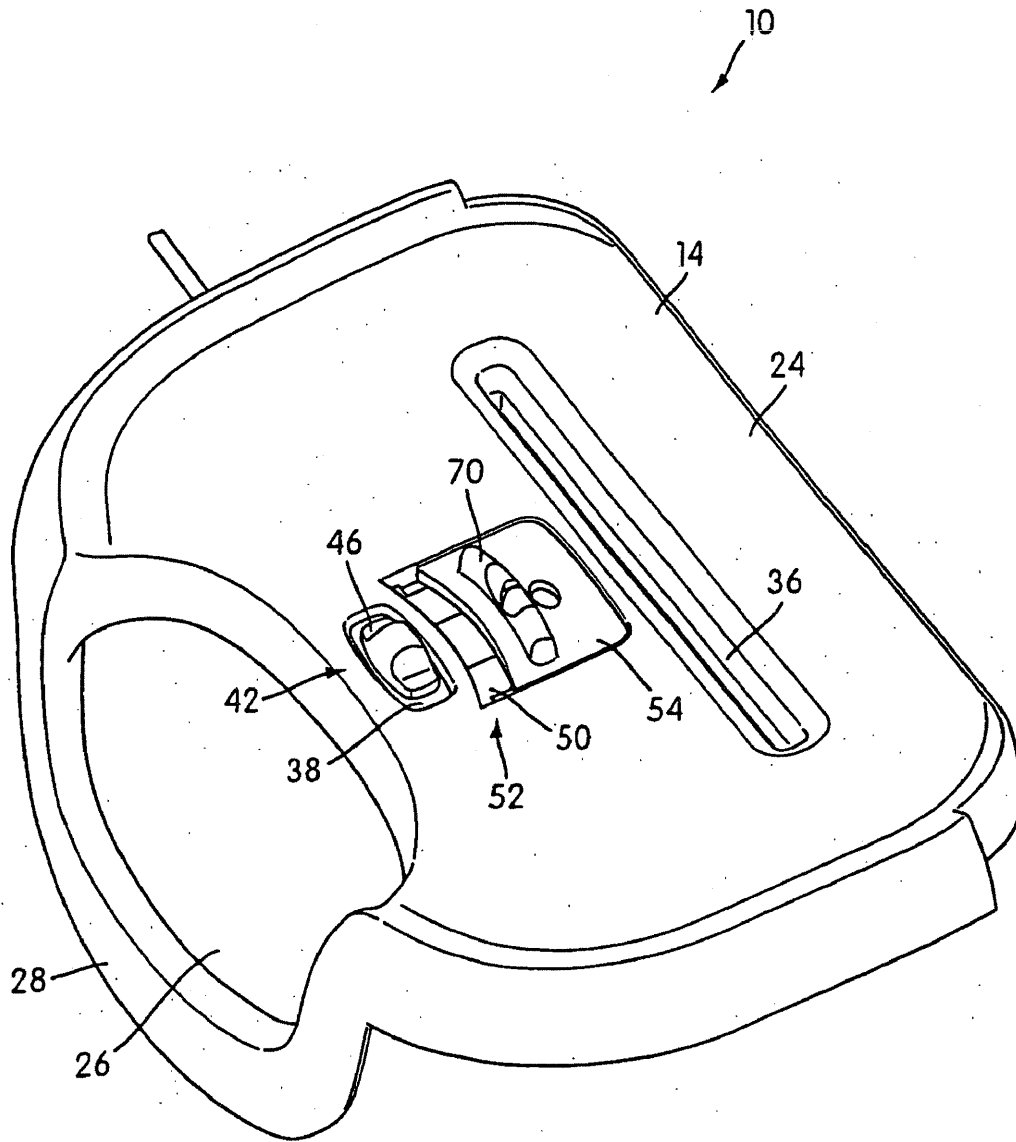


FIG. 2

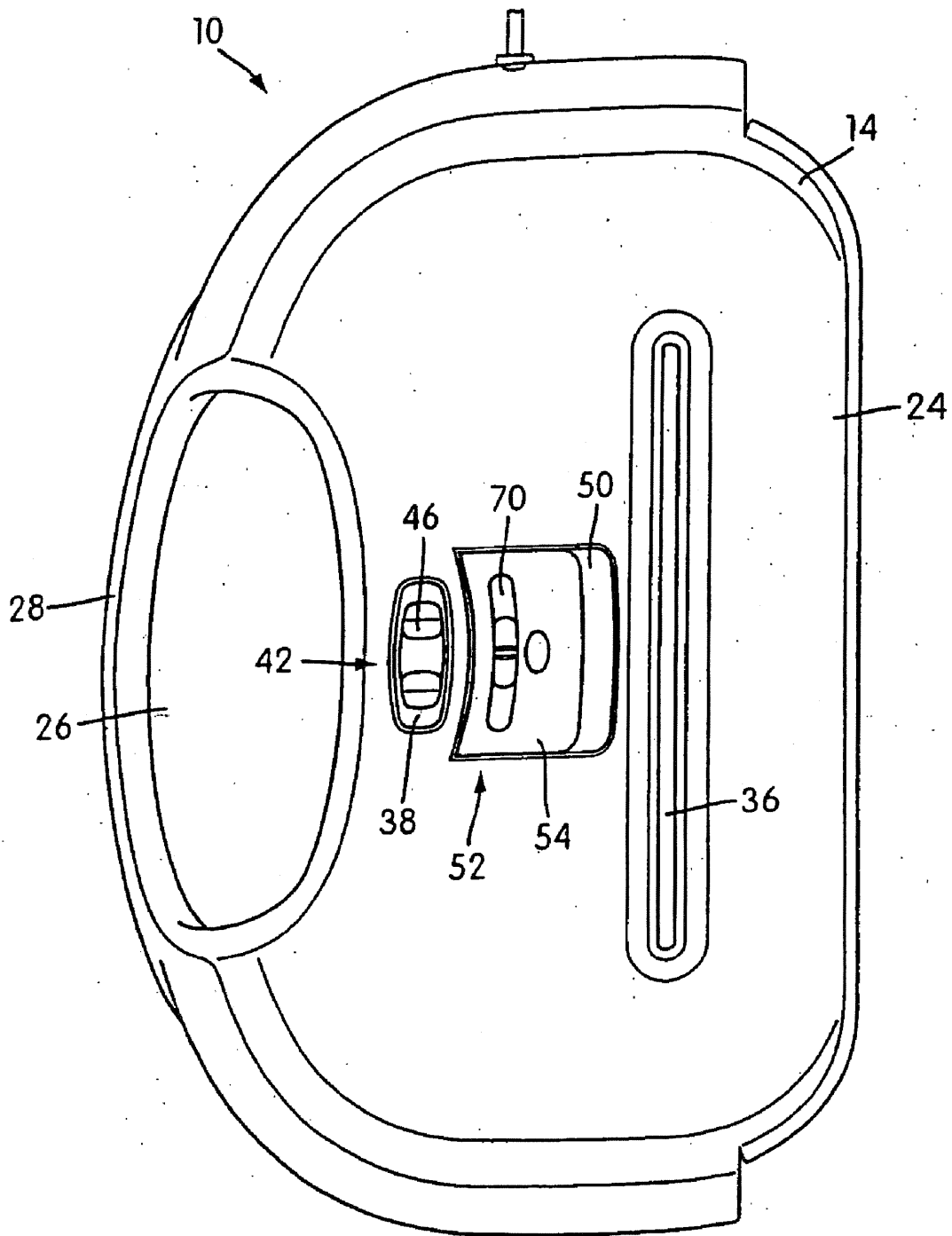


FIG. 3

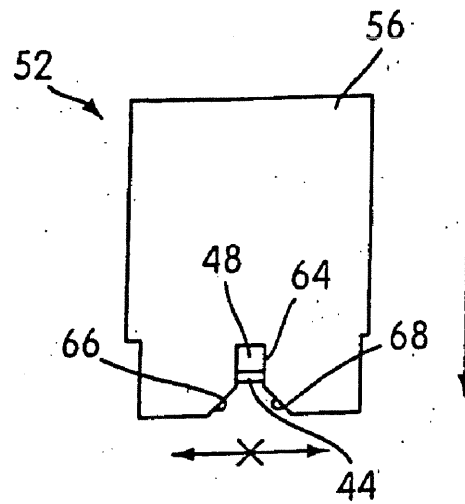


FIG 4A

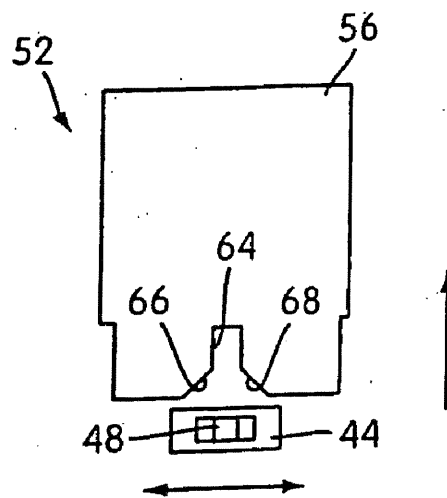


FIG. 4B





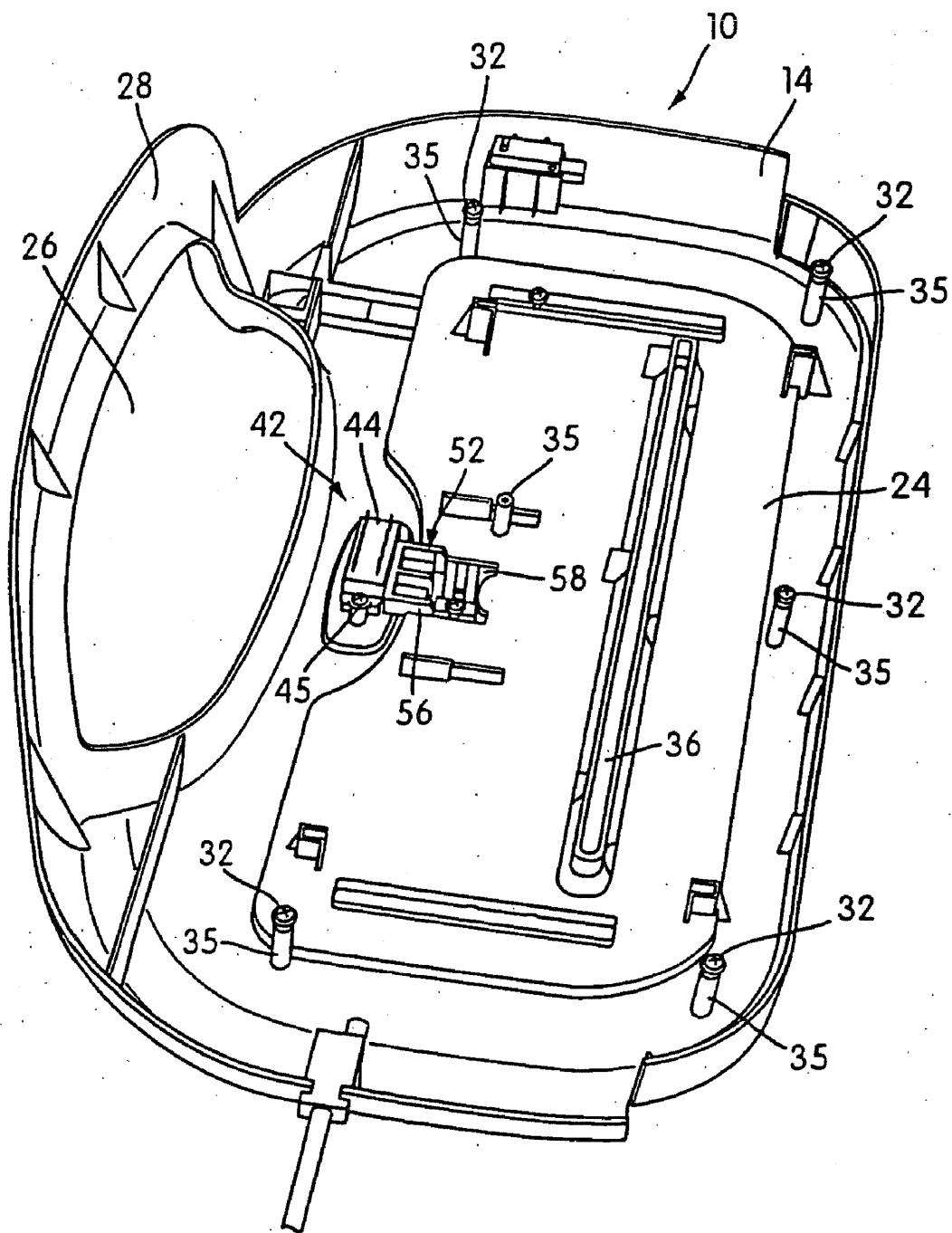


FIG. 6

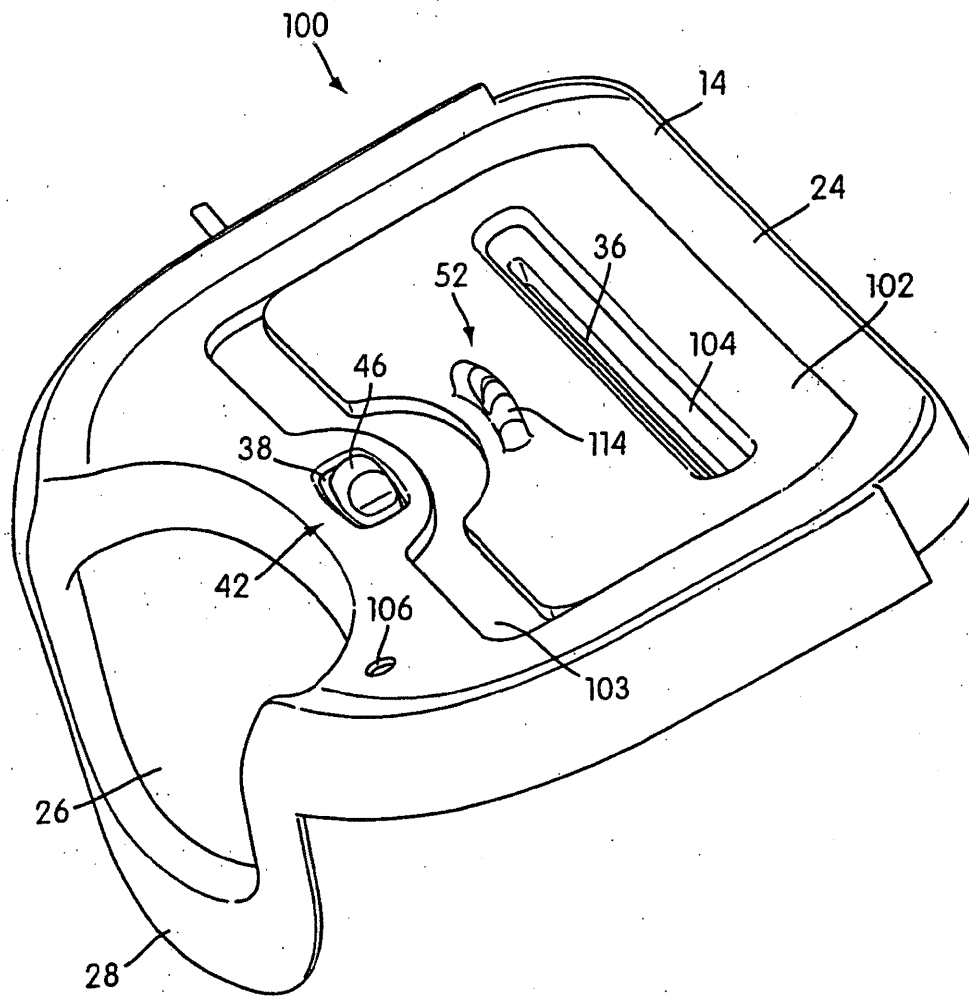


FIG. 7

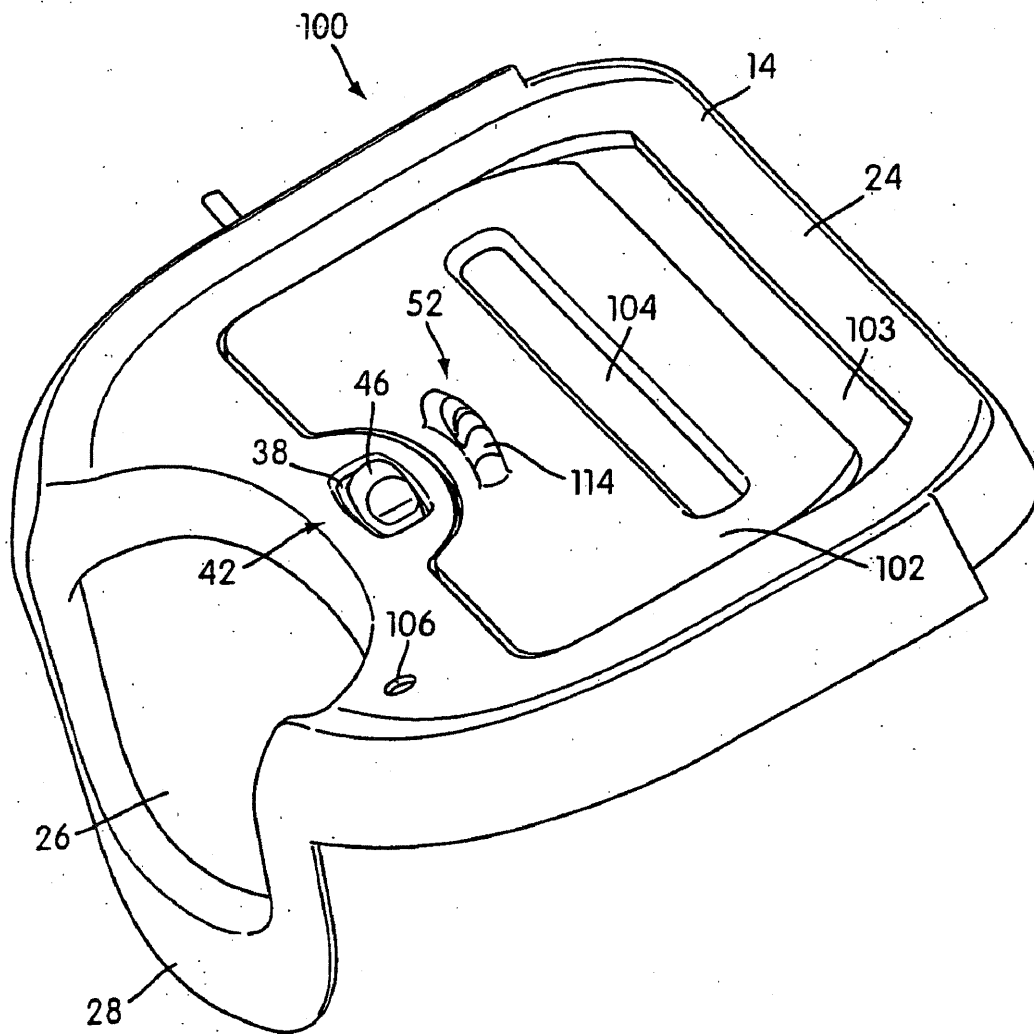


FIG. 8

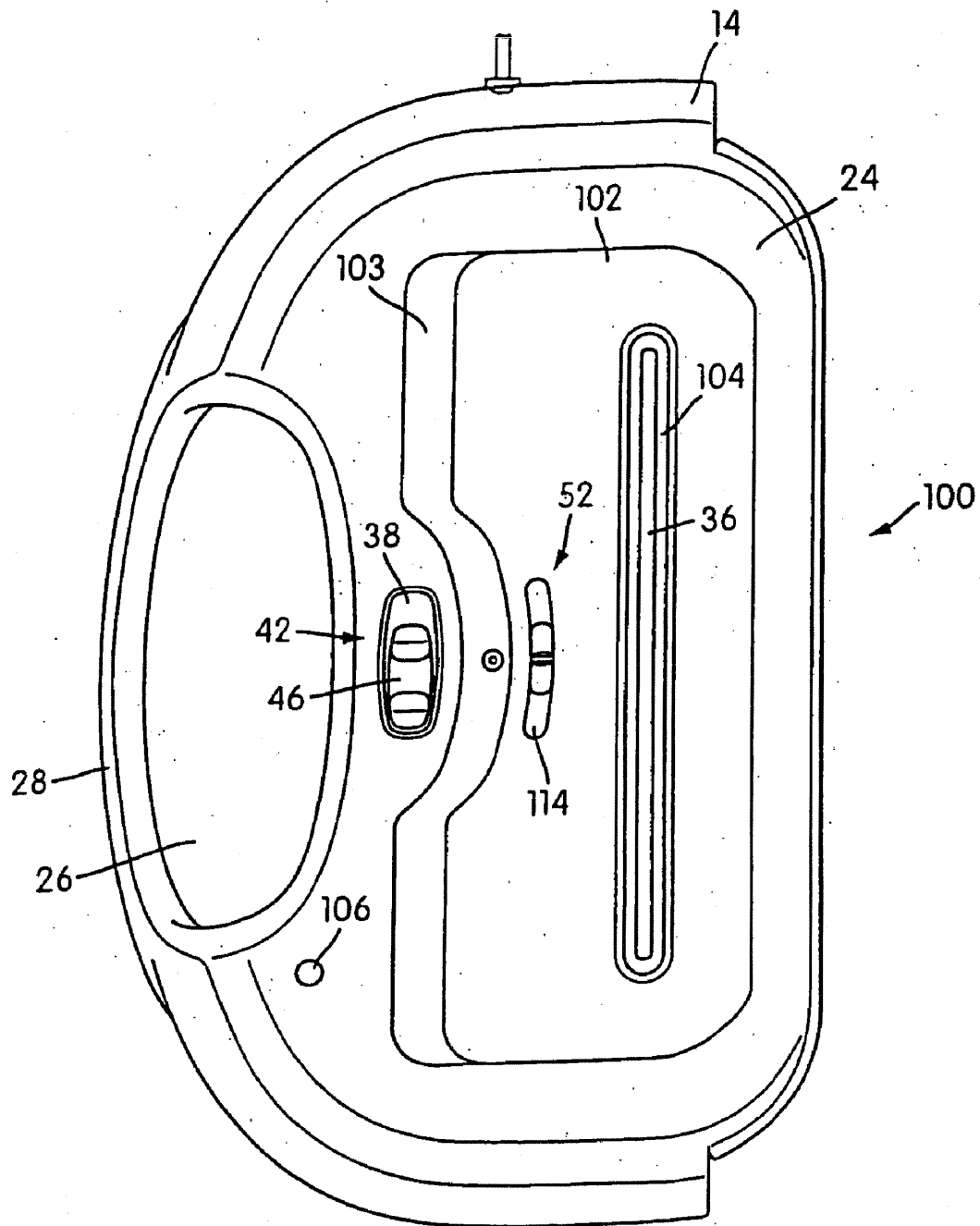


FIG. 9

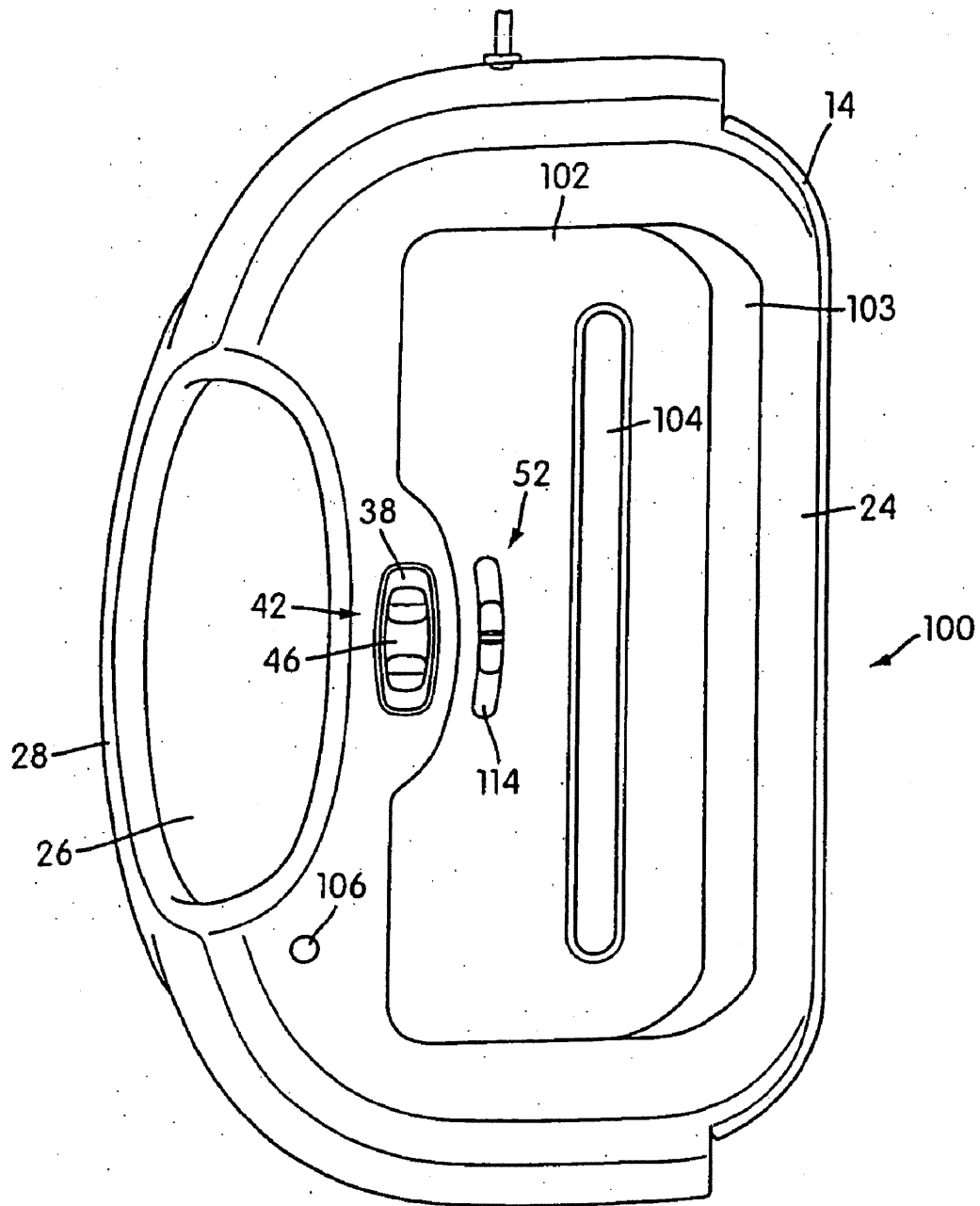


FIG. 10

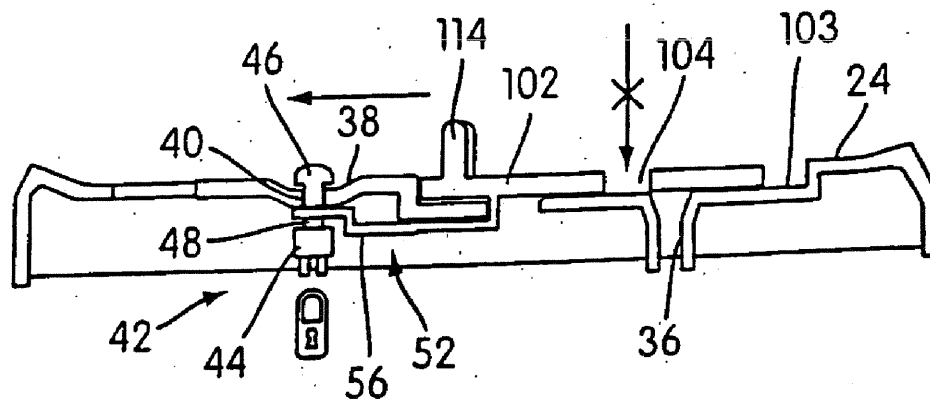


FIG. 11A

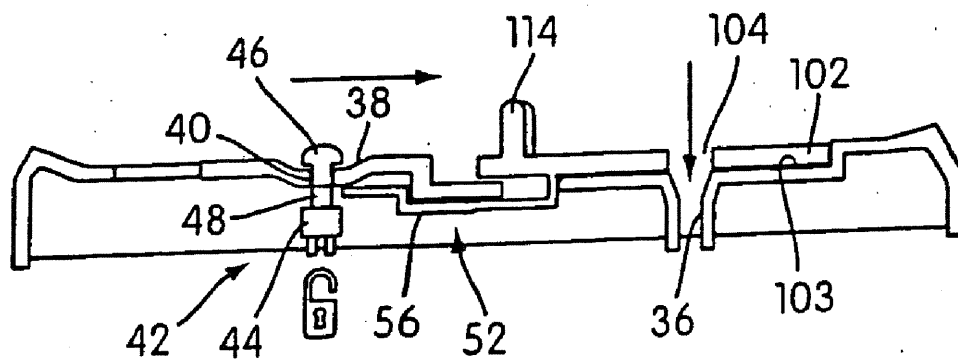
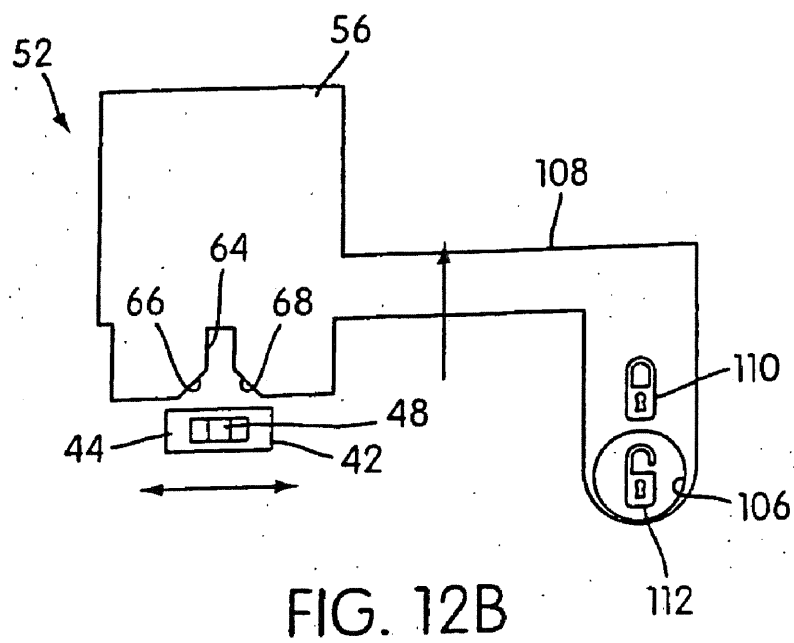
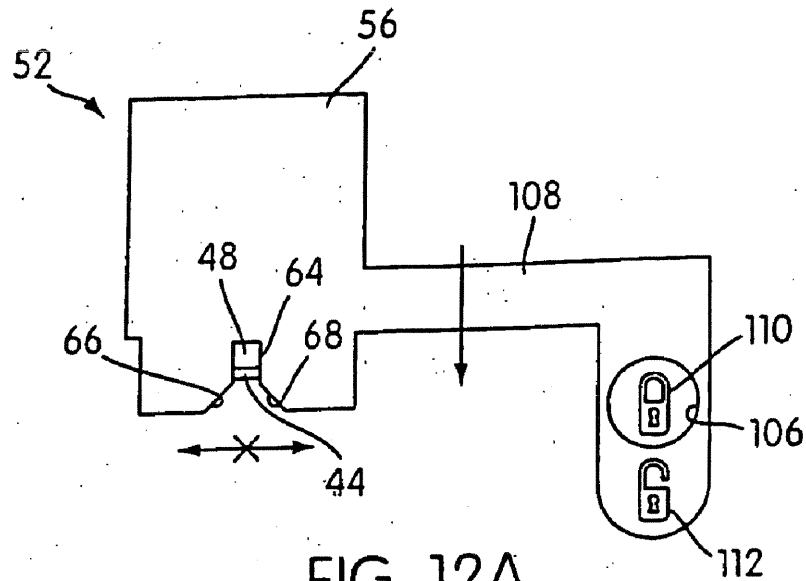


FIG. 11B



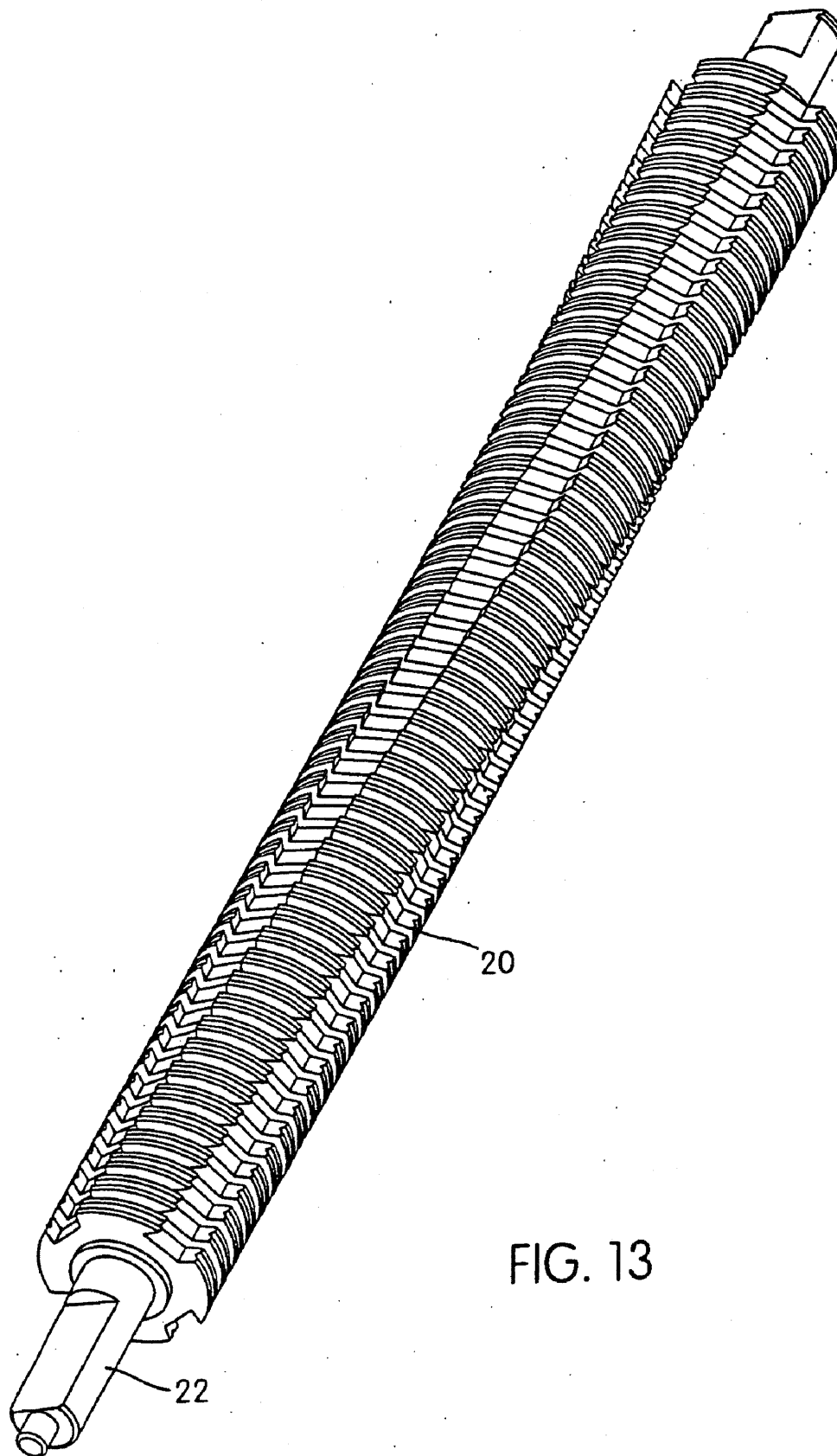


FIG. 13



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**SHREDDER WITH LOCK FOR ON/OFF SWITCH**

## Cross Reference To Related Application

[0001] This application is a Continuation of U.S. Application 10/815,761, filed Apr. 2, 2004, the entire contents of which are incorporated herein by reference.

## FIELD OF THE INVENTION

[0002] The present invention relates to shredders for destroying articles, such as documents, CDs, floppy disks, etc.

## BACKGROUND OF THE INVENTION

[0003] Shredders are well known devices used for shredding items, such as documents, CDs, floppy disks, etc. With identity theft, there has been an increased consumer awareness of the desirability of shredding documents containing sensitive personal information, such as credit card bills, tax documents bearing a person's Social Security number etc.

[0004] Shredders contain a series of cutting elements for shredding articles fed therein. Generally, it is desirable to prevent the inadvertent actuation of the motor driving the cutter elements. To this end, the present invention endeavors to provide a construction that has a reduced chance of being inadvertently actuated.

## SUMMARY OF THE INVENTION

[0005] One aspect of the present invention provides a shredder with a switch lock that locks the on/off switch in its off position. Specifically, the shredder comprises a shredder mechanism including an electrically powered motor and cutter elements. The shredder mechanism enables articles to be shredded to be fed into the cutter elements. The motor is operable to drive the cutter elements so that the cutter elements shred the articles therein. The on/off switch is electrically coupled to the motor of the shredder mechanism. The switch includes a manually engageable portion manually movable by a user's hand between at least (a) an on position wherein the switch enables delivery of electric power to the motor, and (b) an off position disabling the delivery of electric power to the motor. The switch lock is movable between (a) a locking position wherein the switch is locked in the off position, and (b) a releasing position wherein the switch is released for movement from the off position.

[0006] Other objects, features, and advantages will become appreciated from the following detailed description, the accompanying drawings, and the appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a perspective view of a shredder seated atop a container with a switch lock thereof in a locking position;

[0008] FIG. 1A is a perspective exploded view of the shredder of FIG. 1;

[0009] FIG. 2 is a perspective view of the shredder of Figure without the container and with the switch lock in the releasing position thereof;

[0010] FIG. 3 is a top plan view of the shredder of FIG. 1 without the container and with the switch lock in the locking position;

[0011] FIG. 4A is a top plan view showing the switch lock, an on/off switch of the shredder in isolation from the remainder of the shredder with the switch lock in the locking position;

[0012] FIG. 4B is a view similar to FIG. 4A, but with the switch lock in the releasing position;

[0013] FIG. 5 is a bottom perspective view of the shredder of FIG. 1 with the shredder unit mechanism removed and the switch lock in the releasing position;

[0014] FIG. 6 is a view similar to FIG. 5 with the switch lock in the locking position;

[0015] FIG. 7 is a perspective view of an alternative embodiment of a shredder with the container omitted, wherein the switch lock and throat cover move together, with the switch lock in the releasing position and the throat cover in the open position;

[0016] FIG. 8 is a perspective view similar to FIG. 7, but with the switch lock in the locking position and the throat cover in the closed position;

[0017] FIG. 9 is a top plan view of the shredder of FIG. 7 with the switch lock in the releasing position and the throat cover in the open position;

[0018] FIG. 10 is a top plan view similar to FIG. 9, but with the switch lock in the locking position and the throat cover in the closed position;

[0019] FIG. 11A is a vertical cross-section taken through the front to back centerline of the shredder of FIG. 7 with the shredder mechanism removed and with the switch lock in the locking position and the throat cover in the closed position;

[0020] FIG. 11B is a view similar to FIG. 11A, but with the switch lock in the releasing position and the throat cover in the open position;

[0021] FIG. 12A is a top plan view showing the switch lock, the on/off switch of the shredder, a switch lock indicator and an indicator window of the shredder housing in isolation from the remainder of the shredder with the switch lock in the locking position;

[0022] FIG. 12B is a view similar to FIG. 12A, but with the switch lock in the releasing position; and

[0023] FIG. 13 is a perspective view of a shaft with a plurality of cutter elements.

## DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT(S) OF THE INVENTION

[0024] FIGS. 1-6 illustrate an embodiment of a shredder constructed in accordance with one embodiment of the present invention. The shredder is generally indicated at 10. The shredder 10 sits atop a waste container, generally indicated at 12. The shredder 10 illustrated is designed specifically for use with the container 12, as the shredder housing 14 sits on the upper periphery of the waste container 12 is a nested relation. However, the shredder 10 may be of

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the type provided with an adaptable mount for attachment to a wide variety of containers. Generally speaking, the shredder 10 may have any suitable construction or configuration and the illustrated embodiment is not intended to be limiting in any way.

[0025] The shredder 10 includes a shredder mechanism 16 including an electrically powered motor 18 and a plurality of cutter elements 20. The cutter elements 20 are mounted on a pair of parallel rotating shafts 22 in any suitable manner, and an example of a shaft 22 with cutter elements 20 is illustrated in FIG. 13. The motor 18 operates using electrical power to rotatably drive the shafts 22 and the cutter elements 20 through a conventional transmission 23 so that the cutter elements 20 shred articles fed therein. The shredder mechanism 16 also may include a sub-frame 21 for mounting the shafts 22, the motor 18, and the transmission 23. The operation and construction of such a shredder mechanism 16 are well known and need not be described herein in detail. Generally, any suitable shredder mechanism 16 known in the art or developed hereafter may be used.

[0026] The shredder 10 also includes the shredder housing 14, mentioned above. The shredder housing 14 includes top wall 24 that sits atop the container 12. The top wall 14 is molded from plastic and has an opening 26 near the front thereof, which is formed in part by a downwardly depending generally U-shaped member 28. The opening 26 allows waste to be discarded into the container 12 without being passed through the shredder mechanism 16, and the member 28 may act as a handle for carrying the shredder 10 separate from the container 12. As an optional feature, this opening 26 may be provided with a lid, such as a pivoting lid, that opens and closes the opening 26. However, this opening in general is optional and may be omitted entirely. Moreover, the shredder housing 14 and its top wall 24 may have any suitable construction or configuration.

[0027] The shredder housing 14 also includes a bottom receptacle 30 having a bottom wall, four side walls, and an open top. The shredder mechanism 16 is received therein, and the receptacle 30 is affixed to the underside of the top wall 24 by fasteners 32 inserted through bores in posts 34 on the receptacle 30 and engaged with corresponding bores in posts 35 (see FIGS. 5 and 6). The receptacle 30 has a downwardly facing opening 31 for permitting shredded articles to be discharged from the shredder mechanism 16 into the container 12.

[0028] The top wall 24 has a generally laterally extending opening 36 extending generally parallel and above the cutter elements 20. The opening 36, often referred to as a throat, enables the articles being shredded to be fed into the cutter elements 20. As can be appreciated, the opening 36 is relatively narrow, which is desirable for preventing overly thick items, such as large stacks of documents, from being fed into cutter elements 20, which could lead to jamming. The opening 36 may have any configuration.

[0029] The top wall 24 also has a switch recess 38 with an opening 40 therethrough. An on/off switch 42 includes a switch module 44 (FIGS. 4A-6) mounted to the top wall 24 underneath the recess 38 by fasteners 45, and a manually engageable portion 46 that moves laterally within the recess 38. The switch module 44 has a movable element 48 that connects to the manually engageable portion 46 through the

opening 40. This enables movement of the manually engageable portion 46 to move the switch module between its states.

[0030] In the illustrated embodiment, the switch module 44 connects the motor 18 to the power supply (not shown). Typically, the power supply will be a standard power cord 47 with a plug 49 on its end that plugs into a standard AC outlet, but any suitable manner of power delivery may be used. The switch 42 is movable between an on position and an off position by moving the portion 46 laterally within the recess 38. In the on position, contacts in the switch module 44 are closed by movement of the manually engageable portion 46 and the movable element 48 to enable a delivery of electrical power to the motor 18. In the off position, contacts in the switch module 44 are opened to disable the delivery of electric power to the motor 18.

[0031] As an option, the switch 42 may also have a reverse position wherein contacts are closed to enable delivery of electrical power to operate the motor 18 in a reverse manner. This would be done by using a reversible motor and applying a current that is of a reverse polarity relative to the on position. The capability to operate the motor 18 in a reversing manner is desirable to move the cutter elements 20 in a reversing direction for clearing jams. In the illustrated embodiment, in the off position the manually engageable portion 46 and the movable element 48 would be located generally in the center of the recess 38, and the on and reverse positions would be on opposing lateral sides of the off position.

[0032] Generally, the construction and operation of the switch 42 for controlling the motor 18 are well known and any construction for such a switch 42 may be used.

[0033] The top cover 24 also includes another recess 50 associated with a switch lock 52. The switch lock 52 includes a manually engageable portion 54 that is movable by a user's hand and a locking portion 56 (FIGS. 4A-6). The manually engageable portion 54 is seated in the recess 50 and the locking portion 56 is located beneath the top wall 24. The locking portion 56 is illustrated as being integrally formed as a plastic piece with the manually engageable portion 54 and extends beneath the top wall 24 via an opening 58 formed in the recess 50.

[0034] The recess 50 also has a pair of slots 60 on the opposing lateral sides thereof. The manually engageable portion 54 has resilient catch members 62 with flared ends that are inserted into these slots 60 so as to securely mount the switch lock 52 for sliding movement within the recess 50.

[0035] The switch module 44 is mounted so as to define a small space between it and the underside of the top wall 24. The movable element 48 of the switch 42 extends through this space. The locking portion 56 of the switch lock 52 has a switch receiving recess 64 with a pair of angled camming surfaces 66, 68 on opposing sides thereof. This construction causes the switch 42 to move from either its on position or reverse position to its off position as the switch lock 52 is moved from a releasing position to a locking position. In the releasing position, the locking portion 56 is disengaged from the movable element 48 of the switch 42, thus enabling the switch 42 to be moved between its on, off, and reverse positions. In the locking position, the switch lock 52 extends

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into the space between the module 44 and the top wall 24 so that the movable element 48 is received in its off position in the recess 64 and restrained against movement to either its on or reverse position.

[0036] The camming surfaces 66, 68 are provided to move the switch 42 to its off position as the switch lock 52 is moved from its releasing position to its locking position. Specifically, when the switch 42 is in the on position, cam surface 66 will engage the movable element 48 of the switch 42 and cam the same so as to move the switch 42 into the off position with the movable element 48 thereafter restrained against movement from its off position. Likewise, when the switch 42 is in the reverse position, cam surface 68 will engage the movable element 48 and cam the same so as to move the switch 42 to the off position with the movable element 48 thereafter restrained from movement from its off position. FIGS. 4A-6 best illustrate these features of this embodiment of the invention.

[0037] In embodiments where the switch 42 has no reverse position, the corresponding cam surface 68 may be omitted. Also, the switch lock 52 may be constructed to move the switch 42 from the on and/or reverse position to the off position as the switch lock 52 moves from the releasing position to the locking position by any suitable arrangement, and the cam surface(s) are not intended to be limiting. For example, mechanical links or other structures may be used. Moreover, it is not necessary to have the switch lock 52 move the switch 42 into its off position. Instead, the switch lock 52 could be constructed so that the switch 42 is manually moved to its off position prior to moving the switch lock 52 to its locking position.

[0038] Preferably, but not necessarily, the manually engageable portion 54 of the switch lock 52 has an upwardly extending projection 70 for facilitating movement of the switch lock 56 between the locking and releasing positions.

[0039] One advantage of the switch lock 52 is that, by holding the switch 42 in the off position, to activate the shredder mechanism 16 the switch lock 52 must first be moved to its releasing position, and then the switch 42 is moved to its on or reverse position. This reduces the likelihood of the shredder mechanism 16 being activated unintentionally.

[0040] FIGS. 7-11B illustrate another embodiment of a shredder 100. This shredder 100 shares many common features with the shredder 10 of the first embodiment, and those common features are marked with the same reference numerals.

[0041] The primary difference between shredder 10 and shredder 100 is the cover 102. The cover 102 is seated within a recess 103 formed in the top wall 24 and can move between open and closed positions. In the closed position, the cover 102 covers the opening 36 to prevent articles from being fed into the housing 14 and into the cutter elements 20. In the open position, the cover 102 uncovers the opening 36 to allow the articles to be shredded to be fed into the housing 14 and into the cutter elements 20. Specifically, the cover 102 has an opening 104 shaped similarly to opening 36. In the open position, these openings 36, 104 are aligned to enable feeding of articles through the openings 36, 104 and into the cutter elements 20. In the closed position, these openings 36, 104 are out of alignment, thus preventing such feeding of articles into the cutter elements 20.

[0042] In this embodiment, switch lock 52 is integrated as a molded part with the cover 102. Basically, the manually engageable portion 54 illustrated in the previous embodiment is eliminated and the locking portion 56 is formed integrally with the cover 102 (see FIGS. 11A and 11B). As a result, the cover 102 and the switch lock (i.e., locking portion 56) move together between (a) the open position of the cover 102 and the releasing position of the switch lock 52, and (b) the closed position of the cover 102 and the locking position of the switch lock 52.

[0043] As a result of this construction, if the switch 42 is left in the on or reverse position, the user can simply move the cover 102 to its closed position to simultaneously close the opening 36 and move the switch 42 to its off position by the camming action of locking portion 56 moving to its locking position. Of course, if the locking portion 56 is of the type where it does not move the switch 42 to its off position as during movement to the locking position, then the user would first move the switch 42 to its off position. In either case, to use the shredder, the user first moves the cover 102 to its open position, which simultaneously moves the locking portion 56 to its releasing position. Then, the switch 42 can be moved to the on position (or the reverse position if needed).

[0044] The switch lock 52 and the cover 102 need not be linked by being integrally formed together as one piece, and they could be formed separately and linked together for movement in any suitable way. Also, the cover 102 could be independent from the switch lock 52, with the same type of switch lock being used as is used in the first embodiment.

[0045] The cover 102 also has an upwardly extending ridge 114 for facilitating movement of the cover 102 and the switch lock 52.

[0046] In the second embodiment illustrated, the top wall 24 also has an indicator window 106. The window 106 may simply be an opening 106, or it may have a transparent/translucent member therein. An arm 108 is formed integrally with the locking portion 56 and extends therefrom. The end of the arm 108 carries a locked indicator 110 and an unlocked indicator 112. The locked indicator 110 has the appearance of a locked padlock, and the unlocked indicator 110 has the appearance of an unlocked padlock. When the cover 102 is in the closed position and the switch lock 52 provided by locking portion 56 is in the locking position, the locked indicator 110 is located beneath the indicator window 106, enabling the user to visually see the locked indicator 100 and tell that the on/off switch 42 is locked in the off position (FIG. 12A). Likewise, when the cover 102 is in the open position and the switch lock 52 is in the releasing position, the unlocked indicator 112 is positioned beneath the window 106, enabling the user to visually see the unlocked indicator 112 and tell that the on/off switch 42 is freely movable (FIG. 12B).

[0047] Generally, this construction may be considered as providing a status indicator that visually indicates to the user whether the switch lock 52 is in the locking position. As one variation, the unlocked indicator 112 could be eliminated, providing only the locked indicator 110 to indicate that the switch lock 52 is in its locked position, with the locked indicator's absence in the window 106 indicating that switch lock 52 is in its releasing position. As another variation, one or more LEDs or other type of light may be used to indicate



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whether the switch lock 52 is in the locking position. Any other suitable device may be used to indicate the status of the switch lock and the examples herein should not be considered limiting.

[0048] The foregoing embodiments have been provided solely for the purposes of illustrating the structural and functional principles of the present invention, and should not be considered limiting. To the contrary, the present invention is intended to encompass all variations, modifications, and alterations within the spirit and scope of the appended claims.

1. A shredder comprising:

a housing;

a shredder mechanism mounted in the housing and including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

a throat opening provided on the housing for enabling articles to be fed into the shredder mechanism;

an on/off switch electrically coupled to the motor of the shredder mechanism, the switch being movable between at least (a) an on position wherein the switch enables delivery of electric power to the motor and (b) an off position disabling the delivery of electric power to the motor;

the on/off switch comprising a manually engageable portion manually movable by a user's hand to move the on/off switch between at least the on position and the off position;

a switch lock movable between (a) a locking position wherein the switch is locked in the off position and (b) a releasing position wherein the switch is released for movement from the off position;

wherein the switch lock includes a manually engageable portion manually movable by the user's hand to move the switch lock between the locking and releasing positions.

2. A shredder according to claim 1, wherein the switch lock is constructed such that, when the on/off switch is in the on position thereof, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

3. A shredder according to claim 2, wherein the switch lock includes a camming surface configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position.

4. A shredder according to claim 1, further comprising a cover associated with the throat opening of the housing, the cover being movable between (a) a closed position covering the opening for preventing the articles to be shredded from being fed into the housing and into the cutter elements, and (b) an open position uncovering the opening for allowing the articles to be shredded to be fed into the housing and into the cutter elements.

5. A shredder according to claim 4, wherein the cover is linked with the switch lock such that the cover and the switch lock move together between (a) the open position of

the cover and the releasing position of the switch lock and (b) the closed position of the cover and the locking position of the switch lock.

6. A shredder according to claim 5, wherein the cover is manually movable between the open and closed positions thereof, thereby enabling manual movement of the cover between the open and closed positions to move the switch lock between the releasing and locking positions thereof, respectively.

7. A shredder according to claim 6, wherein the switch lock is constructed such that, when the on/off switch is in the on position thereof, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

8. A shredder according to claim 7, wherein the switch lock includes a camming surface configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position.

9. A shredder according to claim 2, wherein the switch is also movable to a reverse position enabling delivery of electric power to the motor so as to operate the motor to drive the cutter elements in a reverse manner, the on position and the reverse position being on opposing sides of the off position,

wherein the switch lock is also constructed such that, when the on/off switch is in the reverse position, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

10. A shredder according to claim 1, comprising a status indicator for visually indicating whether the switch lock is in the locking position.

11. A shredder according to claim 1, wherein the housing has an upwardly facing top wall, and wherein the throat opening is formed in the top wall.

12. A shredder according to claim 11, wherein the manually engageable portion of the on/off switch is mounted for sliding movement on the top wall between the on and off positions of the on/off switch.

13. A shredder according to claim 12, wherein the top wall has an open, upwardly facing recess and wherein the manually engageable portion of the on/off switch is received in said recess.

14. A shredder according to claim 13, wherein the manually engageable portion of the switch lock is mounted for sliding movement on the top wall between the locking and releasing positions thereof.

15. A shredder according to claim 14, wherein the switch lock has a locking portion located beneath the top wall and connected to the manually engageable portion of the switch lock, the locking portion being constructed to engage a portion of the switch beneath the top wall in the locking position of the switch lock to lock the on/off switch in the off position.

16. A shredder according to claim 15, wherein the on/off switch has a switch module located beneath the top wall and connected to the motor for controlling the delivery of electrical power to the motor;

the on/off switch further comprising a movable element located at least in part beneath the top wall and connecting the manually engageable portion of the on/off switch to the switch module;

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the locking portion of the switch lock being constructed to engage the movable element of the on/off switch beneath the top wall in the locking position of the switch lock to lock the on/off switch in the off position.

17. A shredder according to claim 16, wherein a space is provided beneath the top wall between the switch module and the top wall, the movable element of the on/off switch extending in said space and the locking portion of the switch lock being movable within said space to engage the movable element in the locking position of the switch lock to lock the on/off switch in the off position.

18. A shredder according to claim 17, wherein the locking portion of the switch lock includes a recess, the recess being configured to receive the movable element of the switch in the locking position of the switch lock to lock the on/off switch in the locking position.

19. A shredder according to claim 1,

wherein the manually engageable portion of the on/off switch is mounted on an outer wall of the housing for movement between the on and off positions of the on/off switch.

20. A shredder according to claim 19, wherein the manually engageable portion of the on/off switch is mounted to slide between the on and off positions thereof in a first direction, and

wherein the switch lock is mounted for movement between the locking and releasing positions thereof in a second direction perpendicular to the first direction.

21. A shredder comprising:

a housing;

a shredder mechanism including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

a throat opening provided on the housing for enabling articles to be fed into the shredder mechanism;

an on/off switch electrically coupled to the motor of the shredder mechanism, the switch being movable between at least (a) an on position wherein the switch enables delivery of electric power to the motor and (b) an off position disabling the delivery of electric power to the motor;

the on/off switch comprising a manually engageable portion manually movable by a user's hand to move the on/off switch between at least the on position and the off position;

a switch lock movable between (a) a locking position wherein the switch is locked in the off position and (b) a releasing position wherein the switch is released for movement from the off position;

wherein the switch lock includes a manually engageable portion manually movable by the user's hand to move the switch lock between the locking and releasing positions; and

a status indicator provided on the exterior of the housing for visually indicating whether the switch lock is in the locking position.

22. A shredder according to claim 21, wherein the housing has an upwardly facing top wall, wherein the throat opening is formed in the top wall, and wherein the manually engageable portion of the on/off switch is mounted for linear sliding movement on the top wall between the on and off positions of the on/off switch.

23. A shredder according to claim 22, wherein the top wall has an open, upwardly facing recess and wherein the manually engageable portion of the on/off switch is received in said recess.

24. A shredder according to claim 21,

wherein the manually engageable portion of the on/off switch is mounted on a wall of the housing for movement between the on and off positions of the on/off switch.

25. A shredder according to claim 24, wherein the manually engageable portion is mounted to slide between the on and off positions thereof in a first direction, and

wherein the switch lock is mounted for movement between the locking and releasing positions thereof in a second direction perpendicular to the first direction.

26. A shredder according to claim 1, wherein the manually engageable portion of the on/off switch is mounted on a top wall of the housing for linear movement between the on/off positions of the on/off switch.

27. A shredder according to claim 26, wherein the top wall has an open, upwardly facing recess and wherein the manually engageable portion of the on/off switch is received in said recess.

28. A shredder according to claim 1, wherein the manually engageable portion of the switch lock is mounted for movement in a first direction between the locking and releasing positions.

29. A shredder according to claim 28, wherein the manually engageable portion of the on/off switch is mounted for movement in a second direction between the on and off positions of the on/off switch.

30. A shredder according to claim 29, wherein the first and second directions for the movements of the manually engageable portions are perpendicular to one another.

31. A shredder according to claim 30, wherein the manually engageable portion of the on/off switch is mounted on a top wall of the housing.

32. A shredder according to claim 28, wherein the manually engageable portion of the on/off switch is mounted on a top wall of the housing.

33. A shredder according to claim 1, wherein the switch lock is mounted to the housing separately from the on/off switch.

34. A shredder according to claim 11, wherein the switch lock is mounted to the housing separately from the on/off switch.

35. A shredder according to claim 12, wherein the switch lock is mounted to the housing separately from the on/off switch.

36. A shredder according to claim 13, wherein the switch lock is mounted to the housing separately from the on/off switch.

37. A shredder according to claim 19, wherein the switch lock is mounted to the housing separately from the on/off switch.

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38. A shredder according to claim 20, wherein the switch lock is mounted to the housing separately from the on/off switch.

39. A shredder according to claim 26, wherein the switch lock is mounted to the housing separately from the on/off switch.

40. A shredder according to claim 27, wherein the switch lock is mounted to the housing separately from the on/off switch.

41. A shredder according to claim 28, wherein the switch lock is mounted to the housing separately from the on/off switch.

42. A shredder according to claim 29, wherein the switch lock is mounted to the housing separately from the on/off switch.

43. A shredder according to claim 30, wherein the switch lock is mounted to the housing separately from the on/off switch.

44. A shredder according to claim 31, wherein the switch lock is mounted to the housing separately from the on/off switch.

45. A shredder according to claim 32, wherein the switch lock is mounted to the housing separately from the on/off switch.

46. A shredder according to claim 26, wherein in the locking position the switch lock engages an engageable structure beneath the top wall of the housing to lock the on/off switch in the off position, and wherein in the releasing position the switch lock is disengaged from the engageable structure to release the on/off switch for movement from the off position.

47. A shredder according to claim 46, wherein the engageable structure is a part of the on/off switch.

48. A shredder according to claim 46, wherein the switch lock and the engageable structure comprise (a) a recess and (b) a member received in the recess in the locking position of the switch lock, and disengaged from the recess in the releasing position of the switch lock.

49. A shredder according to claim 12, wherein in the locking position the switch lock engages an engageable structure beneath the top wall of the housing to lock the on/off switch in the off position, and wherein in the releasing position the switch lock is disengaged from the engageable structure to release the on/off switch for movement from the off position.

50. A shredder according to claim 49, wherein the engageable structure is a part of the on/off switch.

51. A shredder according to claim 49, wherein the switch lock and the engageable structure comprise (a) a recess and (b) a member received in the recess in the locking position of the switch lock, and disengaged from the recess in the releasing position of the switch lock.

52. A shredder according to claim 19, wherein in the locking position the switch lock engages an engageable structure located interiorly of the outer wall of the housing to lock the on/off switch in the off position, and wherein in the releasing position the switch lock is disengaged from the engageable structure to release the on/off switch for movement from the off position.

53. A shredder according to claim 52, wherein the engageable structure is a part of the on/off switch.

54. A shredder according to claim 52, wherein the switch lock and the engageable structure comprise a recess and a

member received in the recess in the locking position of the switch lock, and disengaged from the recess in the releasing position of the switch lock.

55. A shredder according to claim 20, wherein in the locking position the switch lock engages an engageable structure located interiorly of the outer wall of the housing to lock the on/off switch in the off position, and wherein in the releasing position the switch lock is disengaged from the engageable structure to release the on/off switch for movement from the off position.

56. A shredder according to claim 55, wherein the engageable structure is a part of the on/off switch.

57. A shredder according to claim 55, wherein the switch lock and the engageable structure comprise a recess and a member received in the recess in the locking position of the switch lock, and disengaged from the recess in the releasing position of the switch lock.

58. A shredder according to claim 31, wherein in the locking position the switch lock engages an engageable structure beneath the top wall of the housing to lock the on/off switch in the off position, and wherein in the releasing position the switch lock is disengaged from the engageable structure to release the on/off switch for movement from the off position.

59. A shredder according to claim 58, wherein the engageable structure is a part of the on/off switch.

60. A shredder according to claim 58, wherein the switch lock and the engageable structure comprise a recess and a member received in the recess in the locking position of the switch lock, and disengaged from the recess in the releasing position of the switch lock.

61. A shredder according to claim 32, wherein in the locking position the switch lock engages an engageable structure beneath the top wall of the housing to lock the on/off switch in the off position, and wherein in the releasing position the switch lock is disengaged from the engageable structure to release the on/off switch for movement from the off position.

62. A shredder according to claim 61, wherein the engageable structure is a part of the on/off switch.

63. A shredder according to claim 61, wherein the switch lock and the engageable structure comprise a recess and a member received in the recess in the locking position of the switch lock, and disengaged from the recess in the releasing position of the switch lock.

64. A shredder according to claim 46, wherein the switch lock is mounted to the housing separately from the on/off switch.

65. A shredder according to claim 49, wherein the switch lock is mounted to the housing separately from the on/off switch.

66. A shredder according to claim 52, wherein the switch lock is mounted to the housing separately from the on/off switch.

67. A shredder according to claim 55, wherein the switch lock is mounted to the housing separately from the on/off switch.

68. A shredder according to claim 58, wherein the switch lock is mounted to the housing separately from the on/off switch.

69. A shredder according to claim 61, wherein the switch lock is mounted to the housing separately from the on/off switch.

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70. A shredder according to claim 1, wherein the on/off switch includes a switch module mounted within said housing, and wherein the manually engageable portion of the on/off switch is mounted exteriorly of said housing, the manually engageable portion and the switch module of the on/off switch being connected directly together through an opening in an outer wall of the housing.

71. A shredder according to claim 11, wherein the on/off switch includes a switch module mounted within said housing, and wherein the manually engageable portion and the switch module of the on/off switch are connected directly together through an opening in the top wall of the housing.

72. A shredder according to claim 19, wherein the on/off switch includes a switch module mounted within said housing, and wherein the manually engageable portion and the switch module of the on/off switch are connected directly together through an opening in the outer wall of the housing.

73. A shredder according to claim 28, wherein the on/off switch includes a switch module mounted within said hous-

ing, and wherein the manually engageable portion of the on/off switch is mounted exteriorly of said housing, the manually engageable portion and the switch module of the on/off switch being connected directly together through an opening in an outer wall of the housing.

74. A shredder according to claim 31, wherein the on/off switch includes a switch module mounted within said housing, and wherein the manually engageable portion and the switch module of the on/off switch are connected directly together through an opening in the top wall of the housing.

75. A shredder according to claim 32, wherein the on/off switch includes a switch module mounted within said housing, and wherein the manually engageable portion and the switch module of the on/off switch are connected directly together through an opening in the top wall of the housing.

\* \* \* \* \*

# EXHIBIT G





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May 30, 2007

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VIA FACSIMILE

Donn Harms, Esq.  
American Patent and Trademark Law Center  
12702 Via Cortina, Suite 100  
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Re: Aurora Infringements  
Our Ref.: 082135-0000042

Dear Mr. Harms:

I have still not received a substantive response to my e-mail of March 14, 2007, setting forth a royalty proposal from Fellowes, and my follow-up e-mail of March 27, 2007. On March 28<sup>th</sup> you indicated by e-mail that a response was forthcoming, but we have not heard from you since then. It has been over two months since Fellowes made its proposal, and we need an immediate response.

You should be aware that, since that time, Fellowes tried the '559 patent to a jury verdict against shredders sold by Michilin Prosperity Co. Ltd. of Taiwan and Intek America of Torrance, CA. The '559 patent was found to be infringed and valid in all respects. The switch constructions on the accused shredders in that case are the same as those Aurora shredders in all material respects, and any reasonable jury would come to the same conclusion if we were forced to litigate against Aurora. The trial also started after the Supreme Court's *KSR* decision was issued. Thus, the '559 patent was held valid under the U.S. Supreme Court's obviousness standard as set forth in that case.

We also take this opportunity to advise that Fellowes has filed the '559 patent in a number of major markets, including Europe, Canada, Japan and the People's Republic of China.

We expect a substantive and meaningful answer to this letter and Fellowes' prior royalty proposal by **June 7, 2007**. With respect to the \$50,000 lump sum Fellowes proposed for past damages, that was premised on a rapid resolution of this issue, and therefore Fellowes expects to calculate any royalty from April 1<sup>st</sup> forward or increase the lump sum component as applicable.

If we do not receive a response in advance of that date, Fellowes will assume that Aurora has no interest in seeking an amicable resolution and will proceed accordingly.

Donn Harms, Esq.  
May 30, 2007  
Page 2

We also take this opportunity to advise you and your client of Fellowes' U.S. Patent Publication Nos. 2006-0054724 A1 and 2006-0054725 A1. These applications also have corresponding applications filed in other major markets, such as Europe, Canada and the People's Republic of China. And there is a Japanese counterpart application that is currently pending and under examination, JP 2006075831.

It has come to Fellowes' attention that Aurora is currently marketing shredders under the name Touchguard that incorporate Fellowes' proprietary Safe Sense® technology, which is the subject matter of those patent applications. Consider this letter as formal notice of Fellowes' Safe Sense® patent applications.

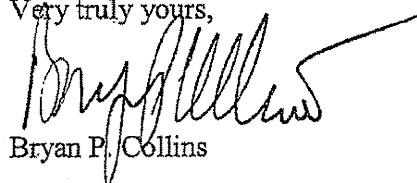
Fellowes' intellectual property is important to its business and it takes protection of that intellectual property seriously. Its Safe Sense® technology represents a significant innovation in shredder safety and a key investment in Fellowes technical and business strategy. Aurora's marketing of that technology cannot be tolerated.

If Aurora has not ceased sales of infringing shredders by the time Fellowes' patents issue, Fellowes will be in contact to discuss its right to collect retroactive pre-grant royalties and to demand cessation of such sales.

Finally, we have yet a third issue to raise with Aurora concerning a trademark infringement issue on Aurora's Touchguard shredders. The Aurora Touchguard shredders utilize a shield logo that is confusingly similar to the shield logo used on Fellowes' Safe Sense® shredders. The similarity of these logos on the same products will lead to consumer confusion as to the source of goods and cannot be tolerated by Fellowes. As such, Fellowes demands that Aurora immediately cease and desist using the shield logo on any and all Aurora shredders.

We expect a response to these other issues as well in advance of the June 7<sup>th</sup> date.

Very truly yours,



Bryan P. Collins

BPC/smm

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# EXHIBIT H



US 20060054724A1

(19) **United States**(12) **Patent Application Publication** (10) Pub. No.: US 2006/0054724 A1  
Matlin et al. (43) Pub. Date: Mar. 16, 2006(54) **SHREDDER WITH PROXIMITY SENSING SYSTEM**

(21) Appl. No.: 10/937,304

(22) Filed: Sep. 10, 2004

(75) Inventors: Taihoon K. Matlin, Round Lake  
Beach, IL (US); Eric Gach, Mount  
Prospect, IL (US)**Publication Classification**

(51) Int. Cl. B02C 25/00 (2006.01)

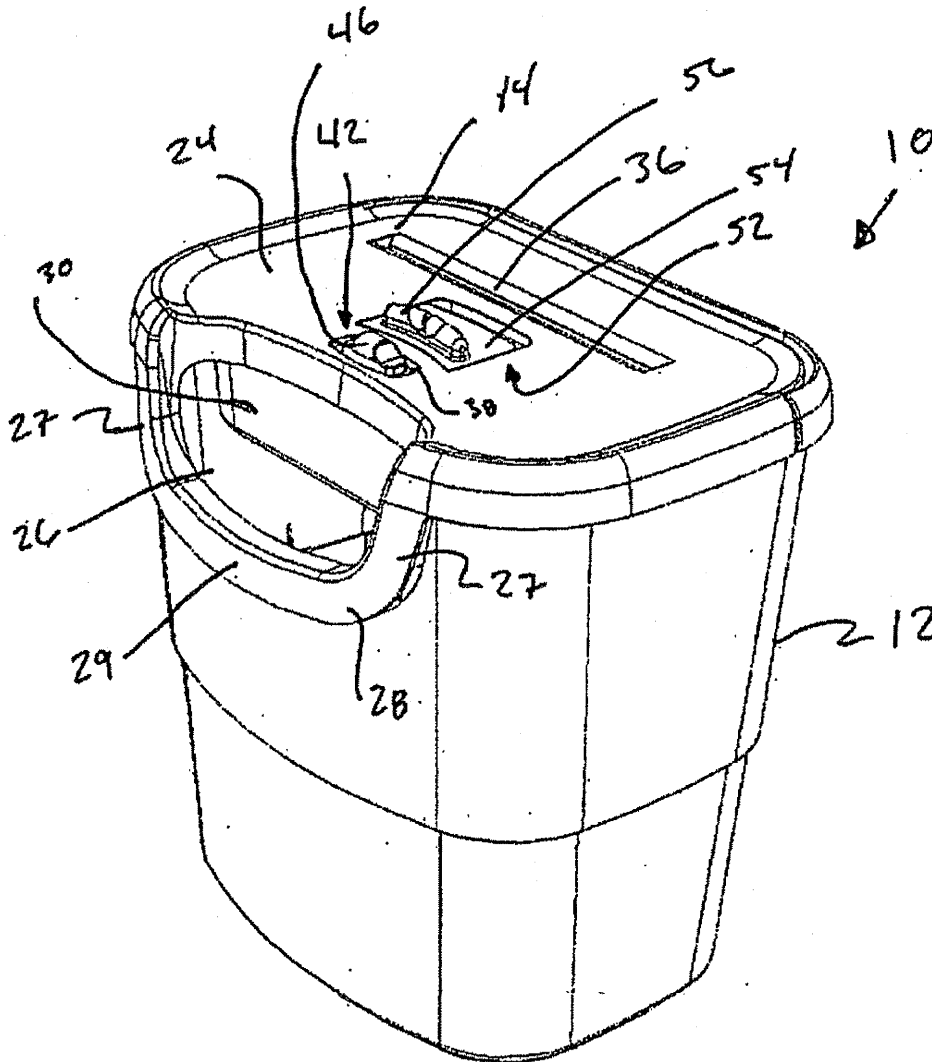
(52) U.S. Cl. 241/37.5; 241/100

(57) **ABSTRACT**

The present invention relates to a shredder that includes a proximity sensing system to sense the presence of a person, animal, or object near cutting elements of the shredder.

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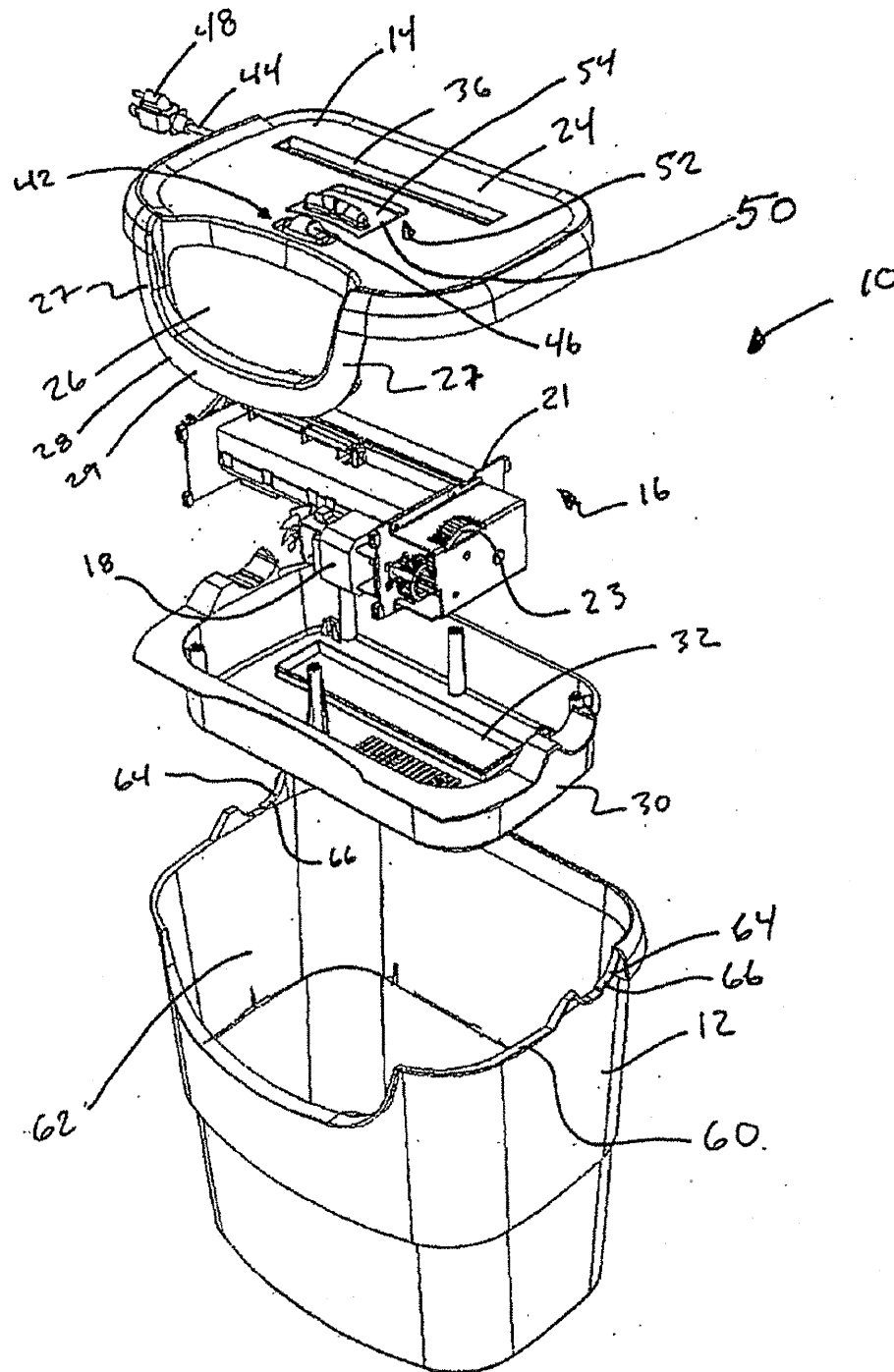


FIG. 2



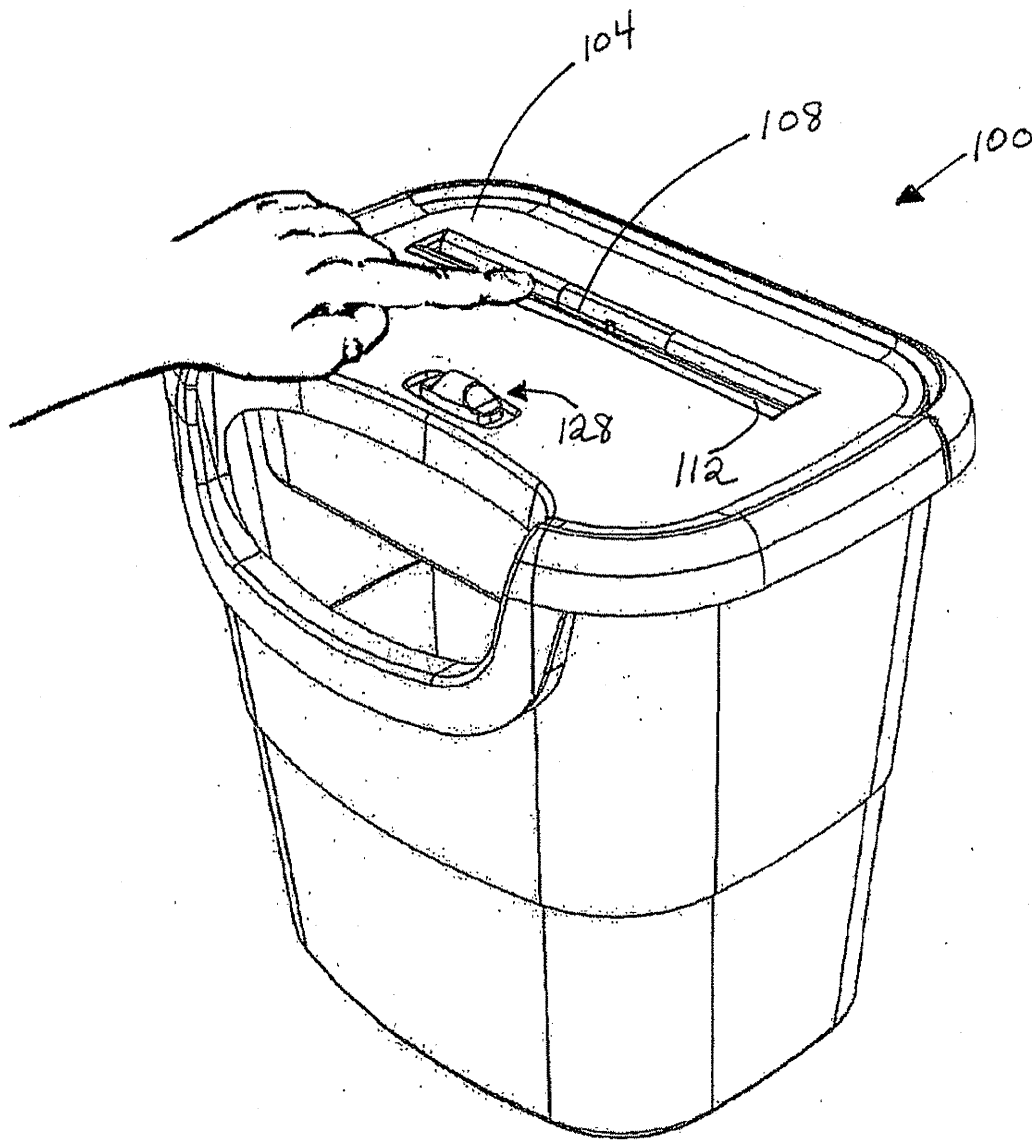


FIG. 3

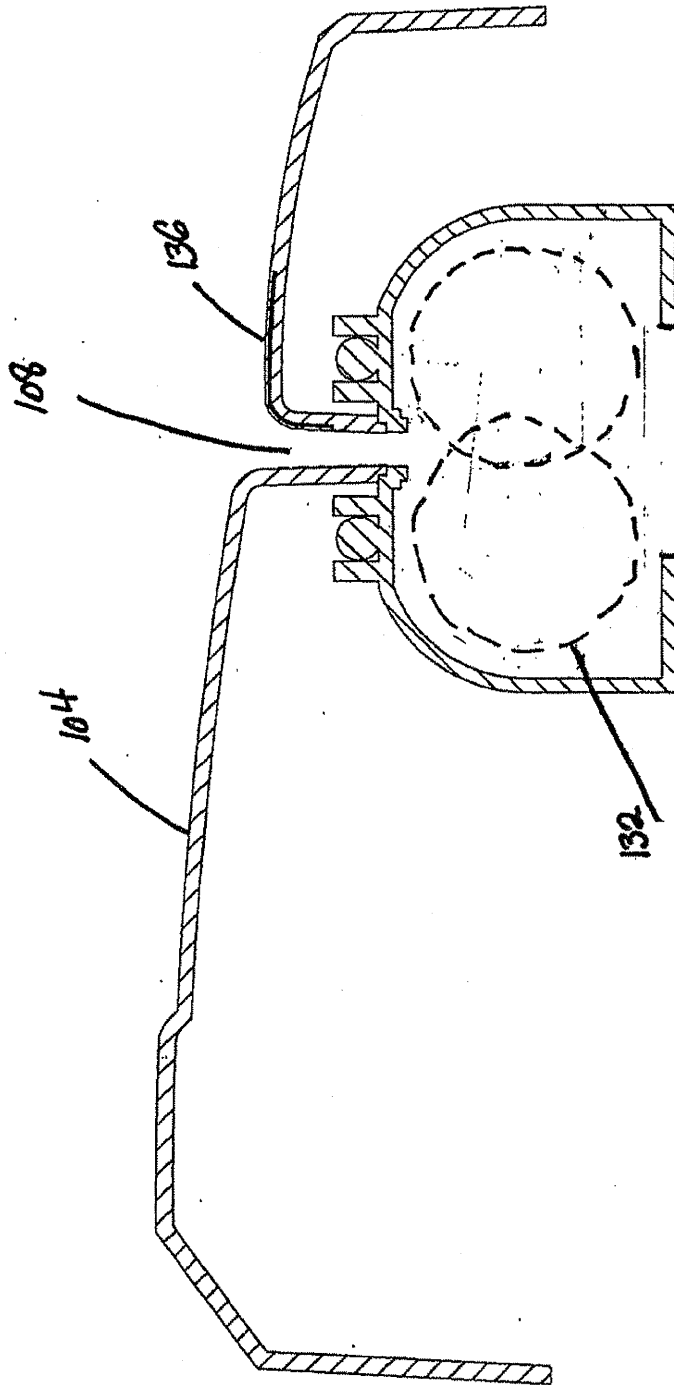


FIG. 4

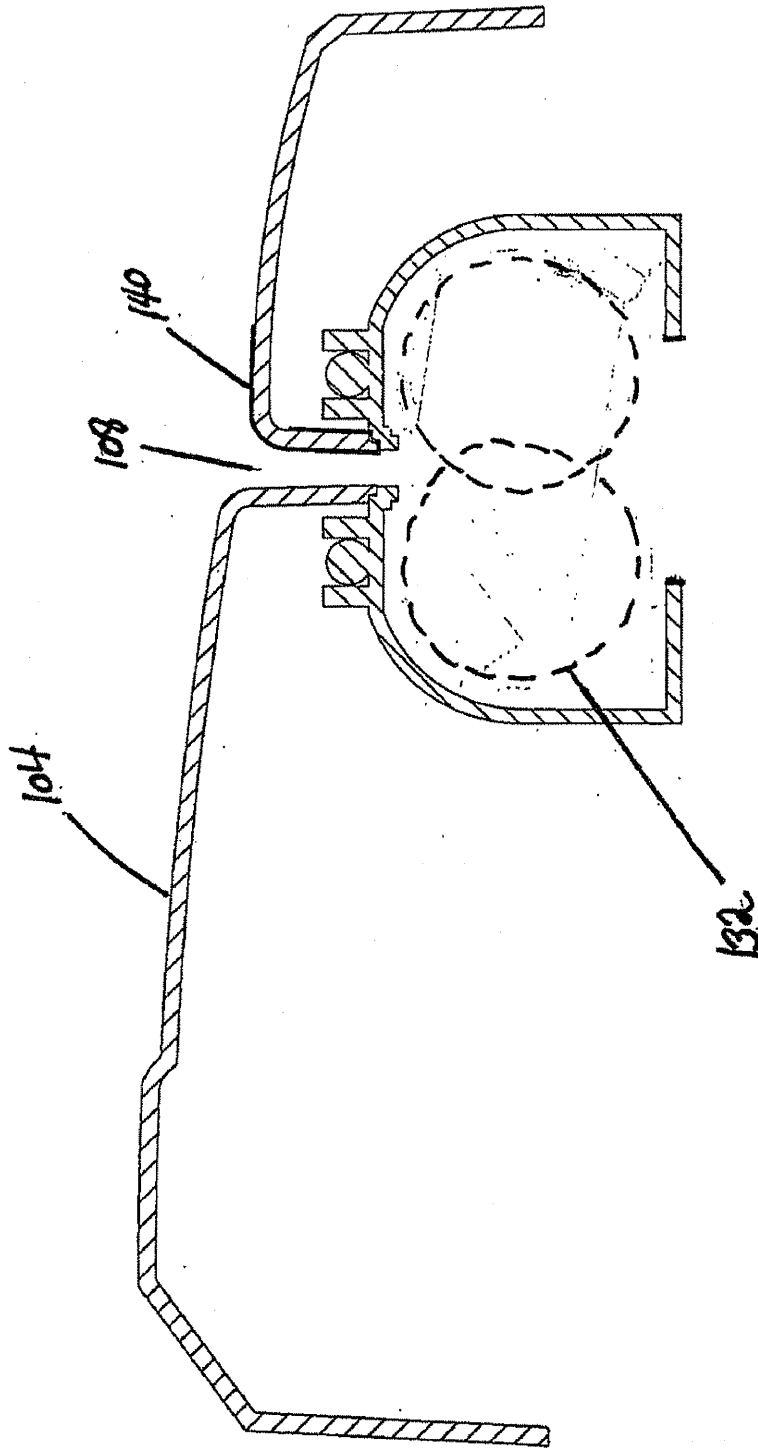


FIG. 5

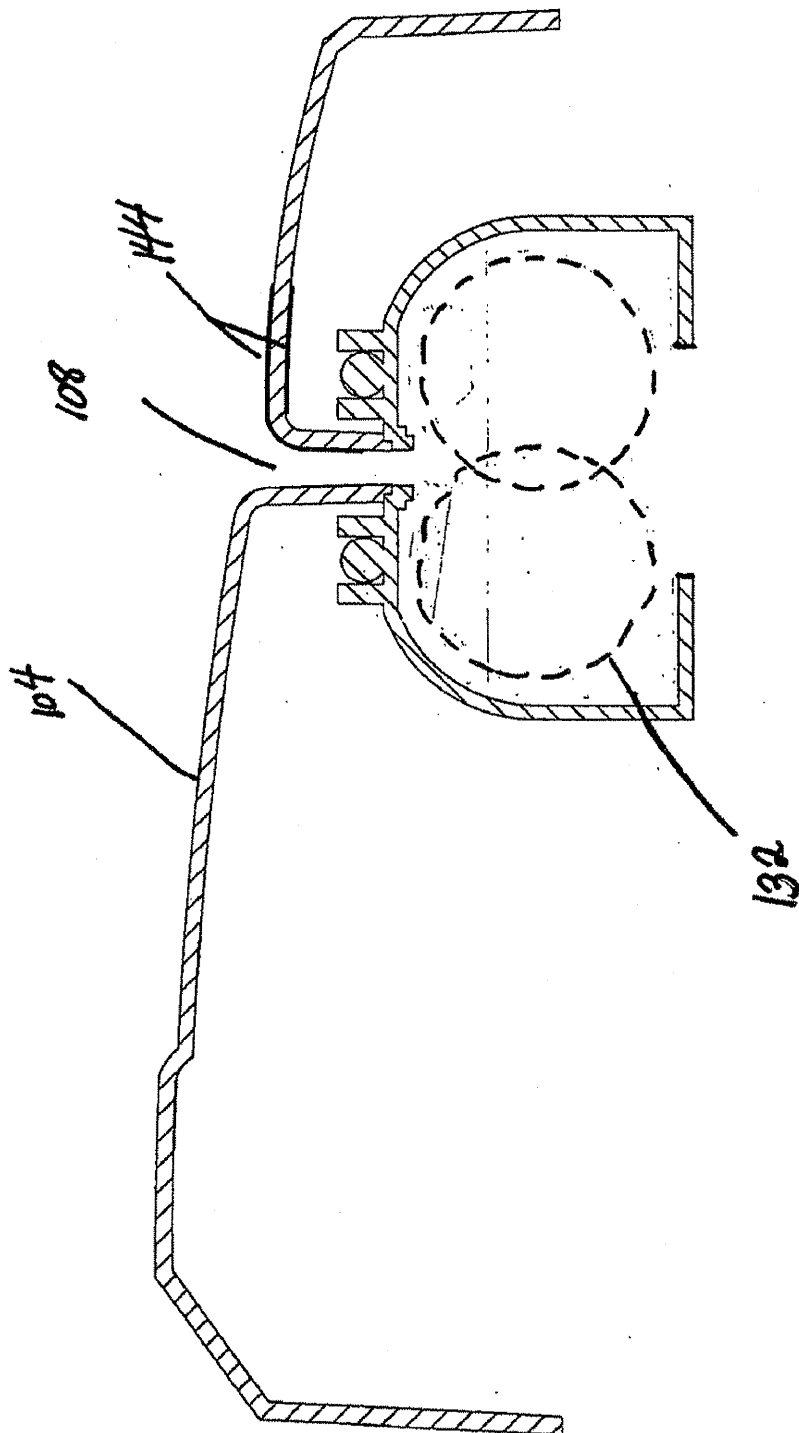


FIG. 6

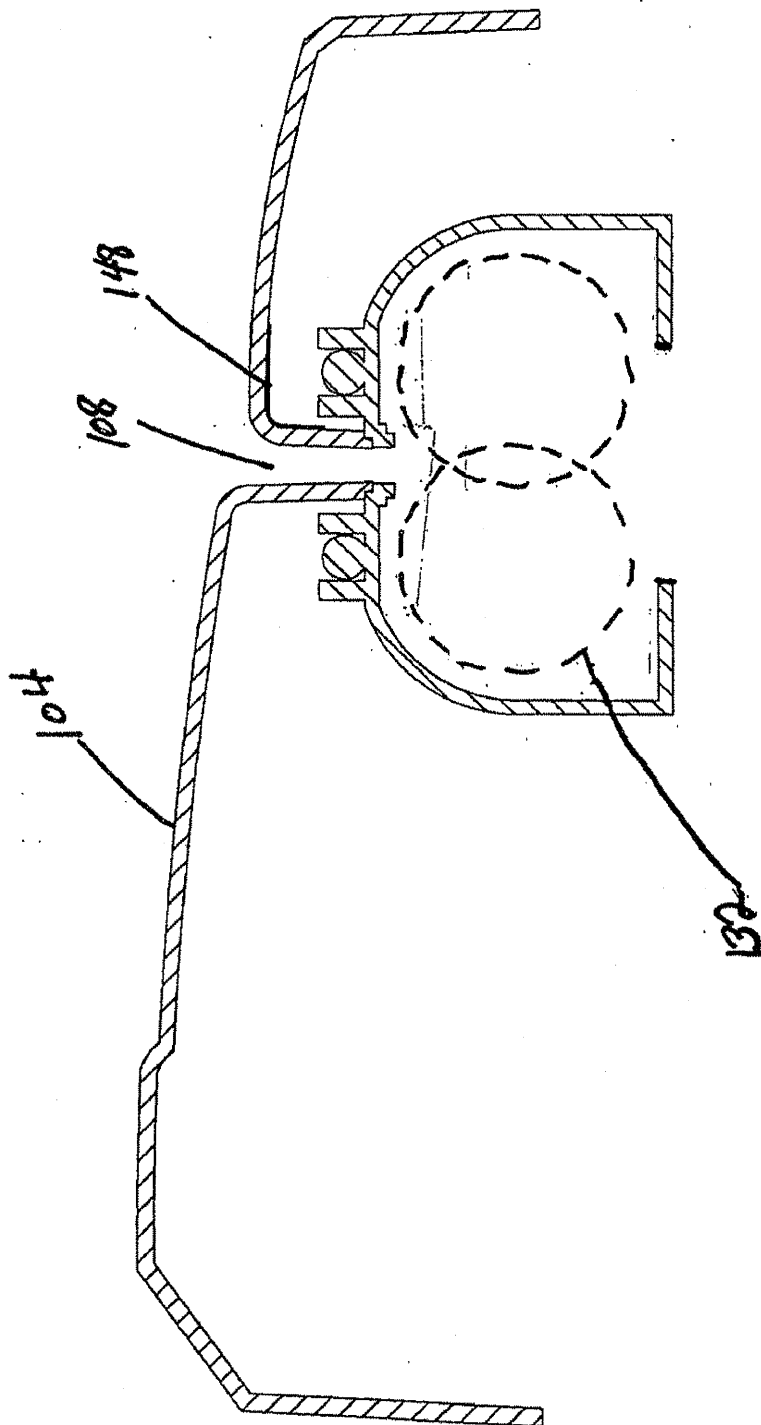
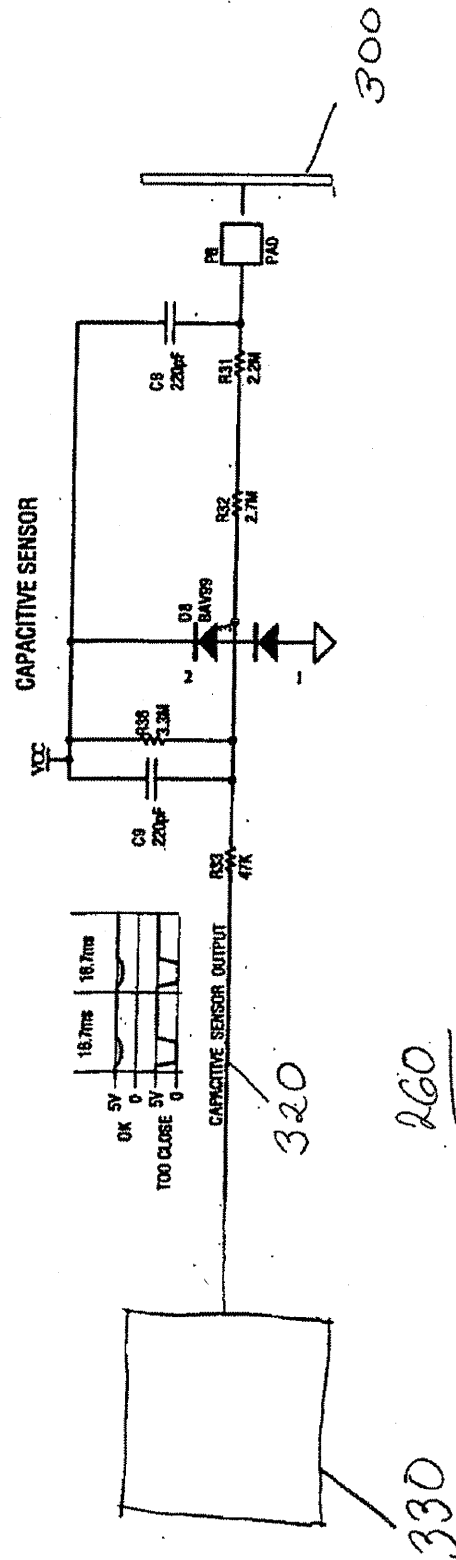
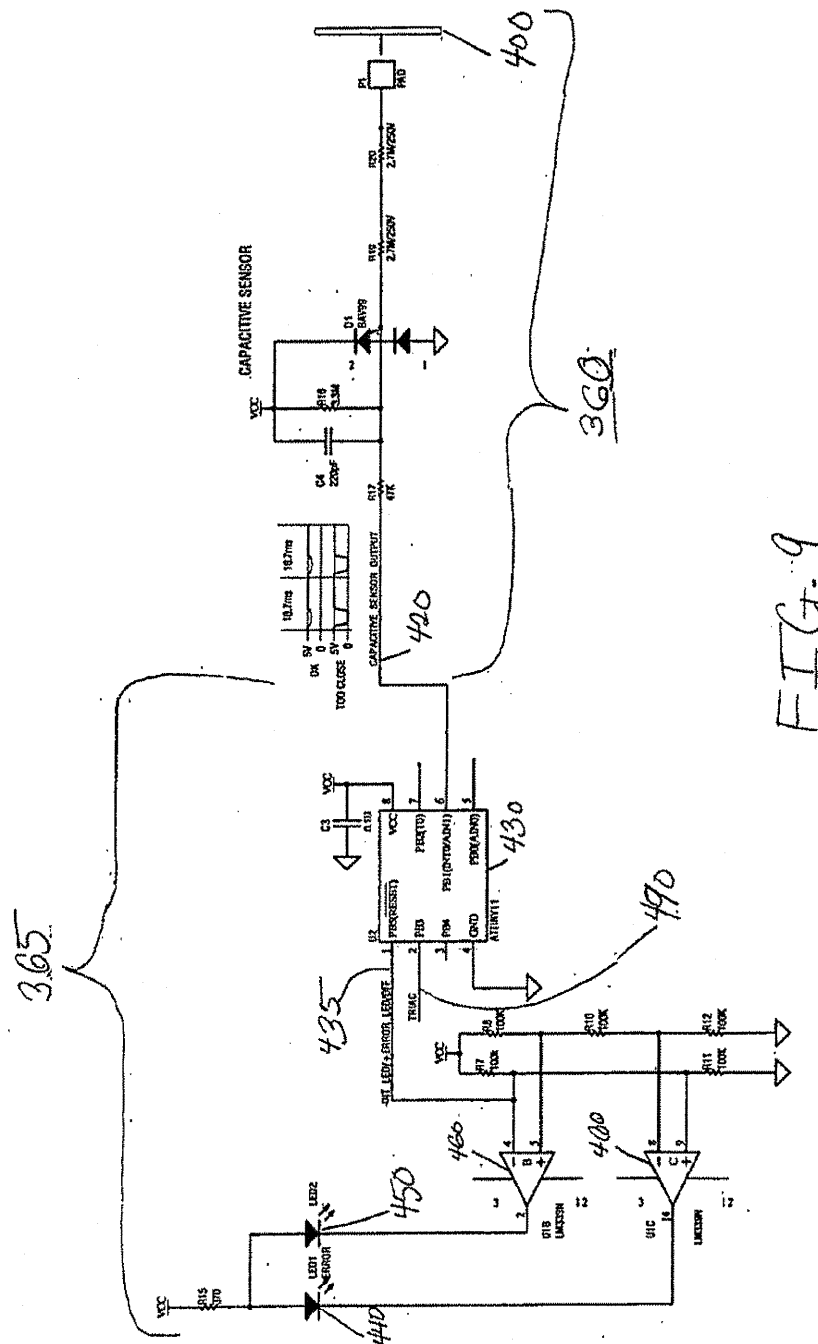


FIG. 7



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## SHREDDER WITH PROXIMITY SENSING SYSTEM

### FIELD OF THE INVENTION

[0001] The present invention relates to shredders for destroying articles, such as documents, CDs, etc.

### BACKGROUND OF THE INVENTION

[0002] Shredders are well known devices for destroying articles, such as documents, CDs, floppy disks, etc. Typically, users purchase shredders to destroy sensitive articles, such as credit card statements with account information, documents containing company trade secrets, etc.

[0003] A common type of shredder has a shredder mechanism contained within a housing that is removably mounted atop a container. The shredder mechanism typically has a series of cutter elements that shred articles fed therein and discharge the shredded articles downwardly into the container. It is generally desirable to prevent a person's or animal's body part from contacting these cutter elements during the shredding operation.

[0004] The present invention endeavors to provide various improvements over known shredders.

### SUMMARY OF THE INVENTION

[0005] One aspect of the present invention provides a shredder comprising a housing, a shredder mechanism including a motor and cutter elements, a proximity sensor, and a controller. The shredder mechanism enables articles to be shredded to be fed into the cutter elements, and the motor is operable to drive the cutter elements so that the cutter elements shred the articles fed therein.

[0006] The housing has an opening enabling articles to be fed therethrough into the cutter elements of the shredder mechanism for shredding. The proximity sensor is located adjacent the opening and configured to indicate the presence of a person or animal in proximity to the opening. The controller is operable to perform a predetermined operation (e.g., to disable the shredder mechanism) responsive to the indicated presence of the person or animal.

[0007] Another aspect of the invention provides a shredder with a proximity sensor that includes an electroconductive element and circuitry to sense a state of the electroconductive element. The proximity sensor is configured to indicate a change in the state of the electroconductive element corresponding to a change in capacitance caused by a person or animal approaching in proximity to the electroconductive element. A controller of the shredder is operable to perform a predetermined operation responsive to the indicated change in the state of the electroconductive element.

[0008] Other objects, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a perspective view of a shredder constructed in accordance with an embodiment of the present invention;

[0010] FIG. 2 is an exploded perspective view of the shredder of FIG. 1;

[0011] FIG. 3 is a perspective view of a shredder constructed in accordance with an embodiment of the present invention;

[0012] FIGS. 4-7 are cross-sectional views each showing a shredder housing, opening, cutting elements, and conductor configuration for a sensor in accordance with various embodiments of the present invention; and

[0013] FIGS. 8 and 9 illustrate example capacitive sensor circuits according to respective embodiments of the present invention.

### DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0014] FIGS. 1 and 2 illustrate a shredder constructed in accordance with an embodiment of the present invention. The shredder is generally indicated at 10. The shredder 10 sits atop a waste container, generally indicated at 12, which is formed of molded plastic or any other material. The shredder 10 illustrated is designed specifically for use with the container 12, as the shredder housing 14 sits on the upper periphery of the waste container 12 in a nested relation. However, the shredder 10 may also be designed so as to sit atop a wide variety of standard waste containers, and the shredder 10 would not be sold with the container. Likewise, the shredder 10 could be part of a large freestanding housing, and a waste container would be enclosed in the housing. An access door would provide for access to and removal of the container. Generally speaking, the shredder 10 may have any suitable construction or configuration and the illustrated embodiment is not intended to be limiting in any way.

[0015] The shredder 10 includes a shredder mechanism 16 including an electrically powered motor 18 and a plurality of cutter elements (not shown). "Shredder mechanism" is a generic structural term to denote a device that shreds articles using cutter elements. Such shredding may be done in any particular way. The cutter elements are mounted on a pair of parallel rotating shafts (not shown). The motor 18 operates using electrical power to rotatably drive the shafts and the cutter elements through a conventional transmission 23 so that the cutter elements shred articles fed therein. The shredder mechanism 16 may also include a sub-frame 21 for mounting the shafts, the motor 18, and the transmission 23. The operation and construction of such a shredder mechanism 16 are well known and need not be described herein in detail. Generally, any suitable shredder mechanism 16 known in the art or developed hereafter may be used.

[0016] The shredder 10 also includes the shredder housing 14, mentioned above. The shredder housing 14 includes top wall 24 that sits atop the container 12. The top wall 14 is molded from plastic and an opening 26 is located at a front portion thereof. The opening 26 is formed in part by a downwardly depending generally U-shaped member 28. The U-shaped member 28 has a pair of spaced apart connector portions 27 on opposing sides thereof and a hand grip portion 28 extending between the connector portions 27 in spaced apart relation from the housing 14. The opening 26 allows waste to be discarded into the container 12 without being passed through the shredder mechanism 16, and the member 28 may act as a handle for carrying the shredder 10



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separate from the container 12. As an optional feature, this opening 26 may be provided with a lid, such as a pivoting lid, that opens and closes the opening 26. However, this opening in general is optional and may be omitted entirely. Moreover, the shredder housing 14 and its top wall 24 may have any suitable construction or configuration.

[0017] The shredder housing 14 also includes a bottom receptacle 30 having a bottom wall, four side walls and an open top. The shredder mechanism 16 is received therein, and the receptacle 30 is affixed to the underside of the top wall 24 by fasteners. The receptacle 30 has an opening 32 in its bottom wall through which the shredder mechanism 16 discharges shredded articles into the container 12.

[0018] The top wall 24 has a generally laterally extending opening 36 extending generally parallel and above the cutter elements. The opening 36, often referred to as a throat, enables the articles being shredded to be fed into the cutter elements. As can be appreciated, the opening 36 is relatively narrow, which is desirable for preventing overly thick items, such as large stacks of documents, from being fed into cutter elements, which could lead to jamming. The opening 36 may have any configuration.

[0019] The top wall 24 also has a switch recess 38 with an opening therethrough. An on/off switch 42 includes a switch module (not shown) mounted to the top wall 24 underneath the recess 38 by fasteners, and a manually engageable portion 46 that moves laterally within the recess 38. The switch module has a movable element (not shown) that connects to the manually engageable portion 46 through the opening 40. This enables movement of the manually engageable portion 46 to move the switch module between its states.

[0020] In the illustrated embodiment, the switch module connects the motor 18 to the power supply (not shown). Typically, the power supply will be a standard power cord 44 with a plug 48 on its end that plugs into a standard AC outlet. The switch 42 is movable between an on position and an off position by moving the portion 46 laterally within the recess 38. In the on position, contacts in the switch module are closed by movement of the manually engageable portion 46 and the movable element to enable a delivery of electrical power to the motor 18. In the off position, contacts in the switch module are opened to disable the delivery of electric power to the motor 18.

[0021] As an option, the switch 42 may also have a reverse position wherein contacts are closed to enable delivery of electrical power to operate the motor 18 in a reverse manner. This would be done by using a reversible motor and applying a current that is of a reverse polarity relative to the on position. The capability to operate the motor 18 in a reversing manner is desirable to move the cutter elements in a reversing direction for clearing jams. In the illustrated embodiment, in the off position the manually engageable portion 46 and the movable element would be located generally in the center of the recess 38, and the on and reverse positions would be on opposing lateral sides of the off position.

[0022] Generally, the construction and operation of the switch 42 for controlling the motor 42 are well known and any construction for such a switch 42 may be used.

[0023] The top cover 24 also includes another recess 50 associated with a switch lock 52. The switch lock 52

includes a manually engageable portion 54 that is movable by a user's hand and a locking portion (not shown). The manually engageable portion 54 is seated in the recess 50 and the locking portion is located beneath the top wall 24. The locking portion is integrally formed as a plastic piece with the manually engageable portion 54 and extends beneath the top wall 24 via an opening formed in the recess 50.

[0024] The switch lock 52 causes the switch 42 to move from either its on position or reverse position to its off position by a camming action as the switch lock 52 is moved from a releasing position to a locking position. In the releasing position, the locking portion is disengaged from the movable element of the switch 42, thus enabling the switch 42 to be moved between its on, off, and reverse positions. In the locking position, the movable element of the switch 42 is restrained in its off position against movement to either its on or reverse position by the locking portion of the switch lock 52.

[0025] Preferably, but not necessarily, the manually engageable portion 54 of the switch lock 52 has an upwardly extending projection 56 for facilitating movement of the switch lock 52 between the locking and releasing positions.

[0026] One advantage of the switch lock 52 is that, by holding the switch 42 in the off position, to activate the shredder mechanism 16 the switch lock 52 must first be moved to its releasing position, and then the switch 42 is moved to its on or reverse position. This reduces the likelihood of the shredder mechanism 16 being activated unintentionally.

[0027] In the illustrated embodiment, the shredder housing 14 is designed specifically for use with the container 12 and it is intended to sell them together. The upper peripheral edge 60 of the container 12 defines an upwardly facing opening 62, and provides a seat 61 on which the shredder 10 is removably mounted. The seat 61 includes a pair of pivot guides 64 provided on opposing lateral sides thereof. The pivot guides 64 include upwardly facing recesses 66 that are defined by walls extending laterally outwardly from the upper edge 60 of the container 12. The walls defining the recesses 66 are molded integrally from plastic with the container 12, but may be provided as separate structures and formed from any other material. At the bottom of each recess 66 is provided a step down or ledge providing a generally vertical engagement surface 68. This step down or ledge is created by two sections of the recesses 66 being provided with different radii.

[0028] The shredder 10 has a proximity sensor to detect the presence of a person or thing (e.g., animal or inanimate object) in proximity to the opening 36. A person or thing is "in proximity" to the opening 36 when a part thereof is outside and adjacent to the opening 36 or at least partially within the opening 36. The proximity sensor may be implemented in various ways, such as is described in further detail below. For further examples of shredders on which a proximity sensor may be used, reference may be made to U.S. patent application Ser. No. 10/828,254 (filed Apr. 21, 2004), Ser. No. 10/815,761 (filed Apr. 2, 2004), and Ser. No. 10/347,700 (filed Jan. 22, 2003), each of which is hereby incorporated into the present application by reference. Generally, the proximity sensor may be used with any type of shredder, and the examples identified herein are not intended to be limiting.

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[0029] FIG. 3 is a perspective view of a shredder 100 constructed in accordance with an embodiment of the present invention. The shredder 100 incorporates a capacitive sensor. The illustrated capacitive sensor is a switch that detects the presence of a person or thing without requiring physical contact. The capacitive sensor includes a conductor/contact plate 112 connected to a circuit, such as those shown in FIGS. 8 and 9. The conductor 112 serves as the first plate of a capacitor, while the person or thing to be detected serves as the second plate thereof. As the distance between the conductor 112 and the person or thing decreases, the mutual capacitance therebetween increases. This increase in capacitance results in increased signal levels in the sensor, which levels can be used to detect the proximity of the person or thing.

[0030] It is to be appreciated that capacitance depends in part on the dielectric constant of the second plate of a capacitor. A higher dielectric constant translates into a larger capacitance. Therefore, the capacitive sensor of the shredder 100 can detect the proximity of a nearby animate or inanimate entity provided that its respective dielectric constant is sufficiently high. Because human beings and various animals have relatively high dielectric constants, they are detectable by the capacitive sensor. Inanimate objects with relatively high dielectric constants also are detectable. Conversely, objects with low or moderate dielectric constants, such as paper, are not detectable.

[0031] The shredder 100 includes a shredder housing 104, an opening 108, and a control switch 128 with on, off, and reverse positions. A shredder mechanism, such as the one described above, is located beneath the opening 108 so that documents can be fed into the shredder mechanism through the opening 108.

[0032] The conductor 112 can be, for example, a strip of metal, foil tape (e.g., copper tape), conductive paint, a silk-screened conductive ink pattern, or another suitable conductive material. As shown in FIG. 3, the conductor 112 is a 9-inch by 1-inch capacitive sensing strip that is affixed to the housing 104 near the opening 108. As such, when a person or thing nears the opening 108 and thus the cutter elements of the shredding mechanism of the shredder 100, the capacitance between the conductor 112 and the person or thing increases, resulting in an increase in the signal level used for detection, as will be described below. To ensure that the switch is sensitive enough to detect the person or thing through multiple sheets of paper, the conductor 112 extends into the opening 108 to increase the overall surface area of the conductor 112 and thus the amount of capacitance between the conductor 112 and the nearby person or thing. The conductor 112 optionally can be covered by non-conductive plastic, for example, thus concealing the switch from a user of the shredder 100. In addition, to increase sensitivity of the switch, such non-conductive plastic can be covered with a conductive material, such as metal foil.

[0033] Though not illustrated in FIG. 3, the shredder 100 can include a sensor light, an error light, and/or a light indicative of normal operation. The sensor light, which can be an LED, is illuminated when a person or thing is detected. The error light, which also can be an LED, is illuminated when a person or thing is detected, and optionally under other conditions (e.g., the shredder container is not properly engaged with the shredder 100, or the shredder mechanism

has become jammed). These lights, however, are not necessary, and are only optional features.

[0034] FIGS. 4-7 are cross-sectional views each showing a shredder housing 104, opening 108, cutting elements 132, and a conductor configuration for a sensor in accordance with various embodiments of the present invention. The conductor configurations can include conductor(s) of different areas to tailor the amount of capacitance and thus the signal level produced when a person or thing nears the shredder. Where multiple conductors are employed, the distance therebetween may be designed also to tailor the amount of capacitive coupling and thus the capacitance produced.

[0035] In FIG. 4, the conductor 136 comprises a conductive material embedded within the upper wall of the housing 104 beneath the upper surface partially into the opening 108. The conductor 136 also is optionally embedded in the wall defining the opening 108 and extends along it for a portion.

[0036] In FIG. 5, the conductive material of the conductor 140 covers an upper surface portion of the housing 104, extends substantially into the opening 108, and curves around a flange of the housing 104 so as to cover an inside surface portion of the housing 104. For a conductor 140 that has a noticeable amount of thickness, the top portion of the upper surface where the conductor 140 is mounted may be recessed.

[0037] The conductor 144 of FIG. 6 includes two conductive portions respectively affixed to outside and inside surface portions of the housing 104. Such use of multiple portions increases the surface area of the capacitor, as well as the capacitive coupling, capacitance, and signal level produced when a person or thing nears the conductive portions.

[0038] The conductor 148 of FIG. 7 comprises a conductive material on an inside surface portion of the housing 104. This is desirable for concealing the conductor 148 without adding the manufacturing step of embedding the conductor in a housing wall, such as is shown in FIG. 4. It is to be appreciated that the conductors of FIGS. 4-7 may be of any suitable configuration, and the examples illustrated are in no way intended to be limiting.

[0039] A conductor or conductive material such as described above in connection with FIGS. 3-7 is typically connected to circuitry on a circuit board. FIGS. 8 and 9 illustrate example capacitive sensor circuits according to respective embodiments of the present invention. The example circuits may be incorporated into the overall circuit design of a shredder, and are in no way intended to be limiting.

[0040] In FIG. 8, the capacitive sensor circuit 260 includes a conductor 300 that can have a configuration such as shown above or another suitable configuration. The conductor 300 is connected to a pad P8, which is in turn connected to circuit loops including capacitors C8 and C9, resistors R31, R32, and R36, and a high-speed double diode D8. The loops are connected to a voltage supply Vcc, circuit ground, and a resistor R33. The voltage supply Vcc is connected to the AC line voltage of the shredder, and a negative regulator can generate -5 volts for the circuit ground. The capacitive sensor output 320 may be in turn coupled as an input to a controller 330, such as a micropro-

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cessor or discrete circuit components (e.g., comparators, transistors), which takes appropriate action in response to signal levels at the output 320. Such a controller 330 may also be a relay switch that opens to disable the delivery of power to an element (e.g., the motor of the shredder mechanism) and closes to enable the delivery of power. It is to be appreciated that "controller" is a generic structural term that denotes structure(s) that control one or more modules, devices, and/or circuit components.

[0041] The principles of operation of the circuit 260 will be readily understood by those conversant with the art. When a person or thing moves close to the conductor 300, the increased capacitance therebetween causes the amplitude of the sinusoidal waveform at the output 320 to increase by a voltage sufficient to indicate the presence of the person or thing. Based on the increased signal level, the controller 330 can, for example, disable the cutting elements of the shredder, illuminate a sensor or error light, and/or activate an audible alert.

[0042] FIG. 9 illustrates a capacitive sensor circuit 360, as well as control and illumination circuitry 365. The capacitive sensor circuit 360 includes a conductor 400 that can have a configuration such as shown above or another suitable configuration. The conductor 400 is connected to a pad P1, which is in turn connected to series resistors R19 and R20. The resistor R19 is connected to circuit loops including a capacitor C4, a resistor R16, and a high-speed double diode D1. The loops are connected to a voltage supply Vcc, circuit ground, and a resistor R17. The voltage supply Vcc is connected to the AC line voltage of the shredder, and a negative regulator can generate -5 volts for the circuit ground. The capacitive sensor output 420 is coupled as an input to a controller 430, which can be, for example, a simple analog circuit or an ATtiny11 8-bit microcontroller offered by Atmel Corporation (San Jose, Calif.).

[0043] The principles of operation of the circuitry of FIG. 9 will be readily understood by those conversant with the art. When a person or thing moves close to the conductor 400, the increased capacitance therebetween causes the amplitude of the sinusoidal waveform at the output 420 to increase by a voltage sufficient to indicate the presence of the person or thing. Based on the increased signal level, the controller 430 sends appropriate control signals. For example, the controller 430 sends a control signal 490 to cut off power (such as supplied by a triac) to the motor that drives the cutting elements of the shredder, and a control signal 435 to illuminate a sensor LED 450 or error LED 440 coupled to comparators 460.

[0044] Embodiments of the present invention may be incorporated, for instance, in a shredder such as the PS80C-2 shredder of Fellowes, Inc. (Itasca, Ill.). If desired, existing shredder designs may be adapted, without major modification of existing modules, to incorporate proximity sensing circuitry.

[0045] In another embodiment of the invention, a shredder can provide two or more sensitivity settings for proximity sensing. The settings can be selectably enabled by a user and tailored to detect, e.g., infants or pets. In an example embodiment employing a capacitive sensor, objects are distinguished based on load times. A smaller capacitive load results in a shorter load time than a large capacitance. Thus, by measuring (e.g., with a microprocessor) differences in

load times resulting from capacitive loads near a sensor, various objects can be distinguished.

[0046] Although various illustrated embodiments herein employ capacitive sensors, it is to be noted that other approaches may be employed to detect the presence of a person or thing near a shredder, such as, for example, approaches utilizing eddy current, inductive, photoelectric, ultrasonic, Hall effect, or infrared proximity sensor technologies.

[0047] The foregoing illustrated embodiments have been provided to illustrate the structural and functional principles of the present invention and are not intended to be limiting. To the contrary, the present invention is intended to encompass all modifications, alterations and substitutions within the spirit and scope of the appended claims.

What is claimed is:

1. A shredder comprising:

a housing;

a shredder mechanism received in the housing and including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

the housing having an opening enabling articles to be fed therethrough into the cutter elements of the shredder mechanism for shredding;

a proximity sensor at least in part located adjacent the opening and configured to indicate the presence of a person or animal in proximity to the opening; and

a controller operable to perform a predetermined operation responsive to the indicated presence of the person or animal.

2. A shredder according to claim 1, wherein the predetermined operation is disabling the shredder mechanism responsive to the indicated presence of the person or animal.

3. A shredder according to claim 1, wherein the predetermined operation is illuminating an indicator responsive to the indicated presence of the person or animal.

4. A shredder according to claim 1, wherein the controller comprises a microcontroller.

5. A shredder according to claim 1, wherein the proximity sensor is a capacitive sensor.

6. A shredder according to claim 5, wherein:

the proximity sensor includes an electroconductive element located adjacent the opening and circuitry to sense a state of the electroconductive element, the proximity sensor being configured to indicate a change in the state of the electroconductive element corresponding to a change in capacitance caused by a person or animal approaching in proximity to the electroconductive element, and

the controller is operable to perform the predetermined operation responsive to the indicated change in the state of the electroconductive element.

7. A shredder according to claim 6, wherein the electroconductive element is a thin metal member extending along a portion of the housing adjacent the opening.



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8. A shredder according to claim 7, wherein the metal member is provided on an interior surface of the housing.

9. A shredder according to claim 8, wherein the metal member is provided only on an interior surface of the housing, and not on an exterior surface.

10. A shredder according to claim 8, wherein the metal member is also provided on an exterior surface of the housing.

11. A shredder according to claim 10, wherein the portion of the housing on which the metal member is provided has an edge that defines part of the opening, and wherein the metal member extends from the interior surface of the housing to the exterior surface over the edge.

12. A shredder according to claim 7, wherein the shredder mechanism is embedded within the housing.

13. A shredder according to claim 7, wherein the metal member is at least in part adhered to the portion of the housing adjacent the opening.

14. A shredder according to claim 13, wherein the metal member comprises metal tape.

15. A shredder according to claim 7, wherein the metal member is at least in part covered by a non-conductive member.

16. A shredder according to claim 15, wherein the non-conductive member is at least in part covered by a conductive member.

17. A shredder according to claim 6, wherein the electroconductive element at least in part comprises metal paint applied to a portion of the housing or to a member associated with the housing.

18. A shredder according to claim 6, wherein the electroconductive element includes at least two metal members each extending along a portion of the housing adjacent the opening.

19. A shredder according to claim 1, wherein the controller at least in part comprises a microprocessor.

20. A shredder according to claim 1, wherein the controller at least in part comprises discrete circuit components.

21. A shredder according to claim 1, wherein the controller at least in part comprises an analog circuit.

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